# PIPE LINE INDUSTRY

CONSTRUCTION • OPERATIONS • MAINTENANCE

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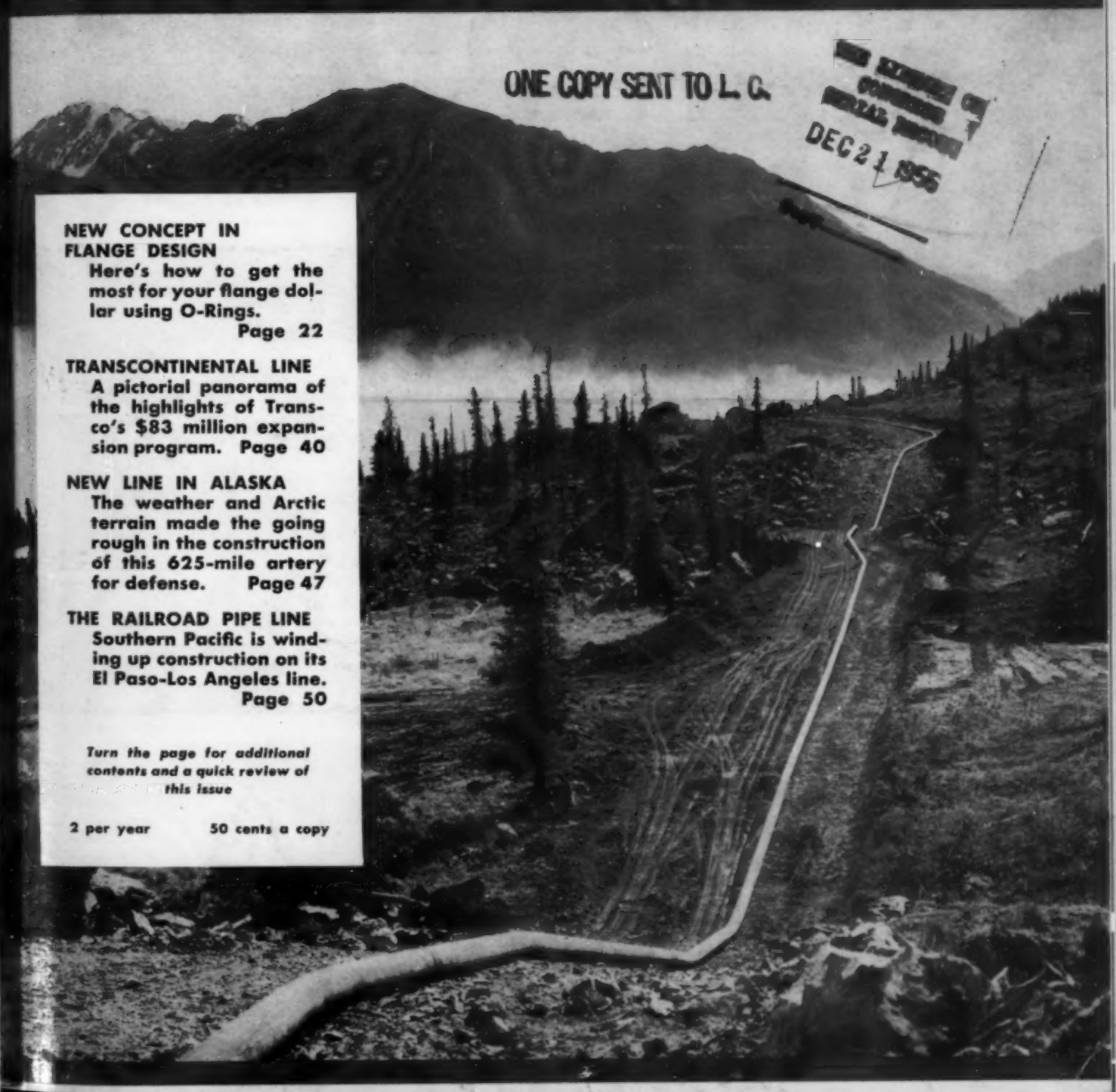

**NEW CONCEPT IN FLANGE DESIGN**
Here's how to get the most for your flange dollar using O-Rings. Page 22

**TRANSCONTINENTAL LINE**
A pictorial panorama of the highlights of Transco's $83 million expansion program. Page 40

**NEW LINE IN ALASKA**
The weather and Arctic terrain made the going rough in the construction of this 625-mile artery for defense. Page 47

**THE RAILROAD PIPE LINE**
Southern Pacific is winding up construction on its El Paso-Los Angeles line. Page 50

*Turn the page for additional contents and a quick review of this issue*

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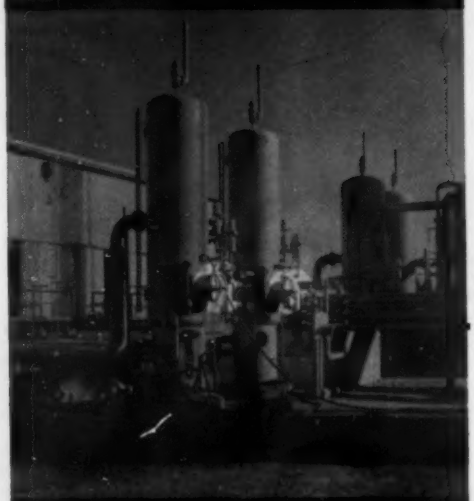
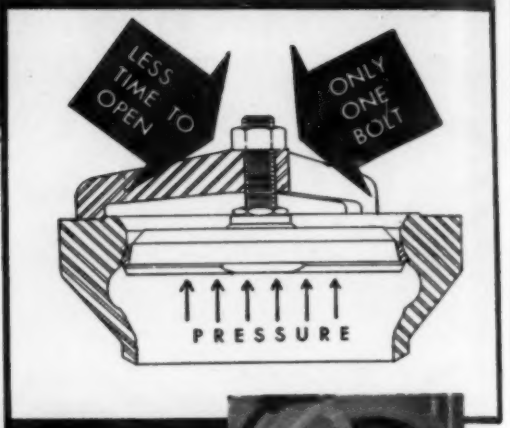
It's no effort at all to reach the internals of this Peerless Gas Odorizer through the Sillers Flex-Ring Closure.



Sillers Flex Ring Closures are utilized on these large scrubbers at a Field Processing Plant in South Texas.

Here is a typical Sillers Flex Ring Closure installation on a Sillers Scraper trap on a products pipeline in Eastern Oklahoma.

# *Faster than ever before...* SILLERS FLEX RING CLOSURES

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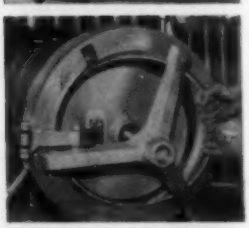

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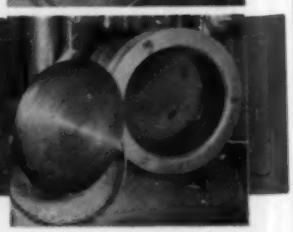

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*Representatives in Principal Cities*

(1). Flex Ring Unit assembled as in service. (2). Spider released, gasket being removed. (3). After gasket is removed, plug is rotated to open. (4). Unit completely opened and in a fraction of time taken for conventional type closures.

B 565512

OCT 13 1955

PIPE LINE INDUSTRY

# CONTENTS and Quick Review

October, 1955 Vol. 3, No. 4

**To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.**

**THE COVER**

This scene is typical of the recently-completed 625-mile 8-inch products line between Haines and Fairbanks, Alaska. Some 500 miles of this line lies above ground. This section of the line skirts one of the many lakes along the right-of-way.

In this issue of PLI are articles on three construction projects of interest.

- The Alaskan line, built for the U. S. Army Corps of Engineers, to serve military requirements for fuels in inland Alaska.
- Transcontinental Gas Pipe Line Corporation's $83 million expansion program.
- Southern Pacific's new line that follows the railroad right-of-way from El Paso to Los Angeles.

These three stories are in keeping with PLI's policy to give its readers up-to-date and authoritative accounts of important developments in the pipe line industry.

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**Getting the Most for Your Flange Dollar Using O-Rings**

☐ Here is a new concept in flange design. Tests have shown that by substituting O-rings on 300 ASA flanges, they can be upgraded to 600 ASA for cold service pressure. The O-ring flanges require little tension on the bolts and less stress is carried over to the adjacent piping.

By E. C. Schuster and V. L. Rupe ..... Page 22

**Lightning and Induced Currents on Pipe Lines**

☐ Several new developments have given the engineer new means to fight unwanted currents on pipe lines caused by lightning and induced currents.

By James R. Cowles ..... Page 26

**Oil Losses . . . How to Stop Them**

☐ Oil losses on a pipe line system can spell the difference between profit and loss. Here is a review of possible sources of loss, how to estimate the losses, and what to do about them.

By George E. Hughes, Jr. ..... Page 29

**They Like Pipeliners in Appomattox, Va.**

☐ Here is the story of what happened when 446 pipeliners and their families moved into this small southern town of 1200 population. It's a heart-warming story of how the Virginians took the pipe line people into their homes . . . and hearts ..... Page 32

**Streamlining a Small Pipe Line**

☐ Deep Rock Oil Corporation set out to cut labor costs and crude losses. Their revamping program was so successful that it almost paid for itself.

By H. D. Chrislip ..... Page 35

**Big Pipe With Slick Inside Pays Off**

☐ This was one of the outstanding facts that emerged from Transcontinental Gas Pipe Line Corporation's $83 million expansion program. The story inside tells of others in a pictorial panorama.

By Donald M. Taylor ..... Page 40

**Alaskan Products Line Completed**

☐ Three contractors began the construction of this 625-mile defense artery in December, 1953. Construction was completed early this past summer. The line has been under test operation for two months.

By Melvin A. Judah ..... Page 47

**Railroad Pipe Line Near Completion**

☐ Southern Pacific Pipe Lines Incorporated is finishing up construction on its line to carry gasoline and fuels from El Paso and Los Angeles refining areas to Arizona.

By Gilbert M. Wilson ..... Page 50


PIPE LINE INDUSTRY published every month. Entered as second class mail matter July 9, 1954, at the post office at Houston, Texas, under the act of March 3, 1879.

# Increased Pipe Line Construction Ahead

**Further vigorous expansion** lies ahead of the pipe line branch of the petroleum industry. This bright prospect is based on expectations that there will be no interruption in the miraculous growth in oil consumption.

There is every reason to expect a continued sharp growth in consuming rates. Population in coming years will grow faster than ever before. Per capita consumption will rise throughout the world, as many countries become more heavily industrialized and mechanized. There will be more homes to heat with oil and gas. There will be more automobiles, trucks, buses, planes, farm implements and trains using oil. Furthermore, new uses for oil and gas are being developed constantly. Jet airplane fuel was unheard of 10 years ago. Synthetic rubber is a war development. The manufacture of alcohols, ethers, plastics, detergents, cloth fibers, fertilizers and all the other petro-chemicals are new industries based on oil and gas.

The world is using twice as much oil today as 10 years ago, but is likely to again double its consuming rates during the next 20 years. By 1975 world demand probably will reach 29 to 30 million barrels per day. Current world consumption is 15½ million barrels daily, in contrast with only 7⅔ million barrels per day in 1945.

It follows that pipe line construction must be of sufficient volume to provide enough capacity to transport the greater quantities that will be consumed in the future.

•

**The U. S. is to use more** oil and gas in the future. Population of the U. S. is increasing more rapidly than in the past. The U. S. Census Bureau has predicted that population of this country will reach 220 million people by 1975, an increase of 55 million during the next 20 years compared with a gain of only 38 million during the preceding 20 years. This factor alone indicates much higher U. S. consumption. In addition, the U. S. continues to become more highly mechanized and industrialized.

Consequently, U. S. demand for oil is likely to reach 14 million barrels daily by 1975, nearly 6 million barrels greater than the 8¼ million barrels which will be consumed during 1955. This estimate may prove conservative, postwar growth being above this rate of increase.

While an increasing portion of the world's oil production will come from abroad, the anticipated tremendous surge in U. S. consumption will require greater domestic producing rates also. Hence, it will be necessary to expand the capacity of U. S. crude oil pipe lines. More natural gas lines also will be necessary in the U. S. to satisfy the larger future demand for this product. Added to this picture is the trend toward greater use of pipe lines to transport refined products.

These factors add up to the conclusion that the future will require great enlargement of the U. S. oil and gas pipe line system.

•

**An even greater growth** will occur abroad. Consumption of oil is growing more rapidly elsewhere in the world. Demand abroad has more than doubled in the past 10 years. Daily consumption in 1955 will reach 7¼ million barrels, 2½ times greater than the slightly over 2¾ million barrels consumed in 1945. It seems probable that demand outside of the U. S. will climb to 15 or 16 million barrels daily by 1975.

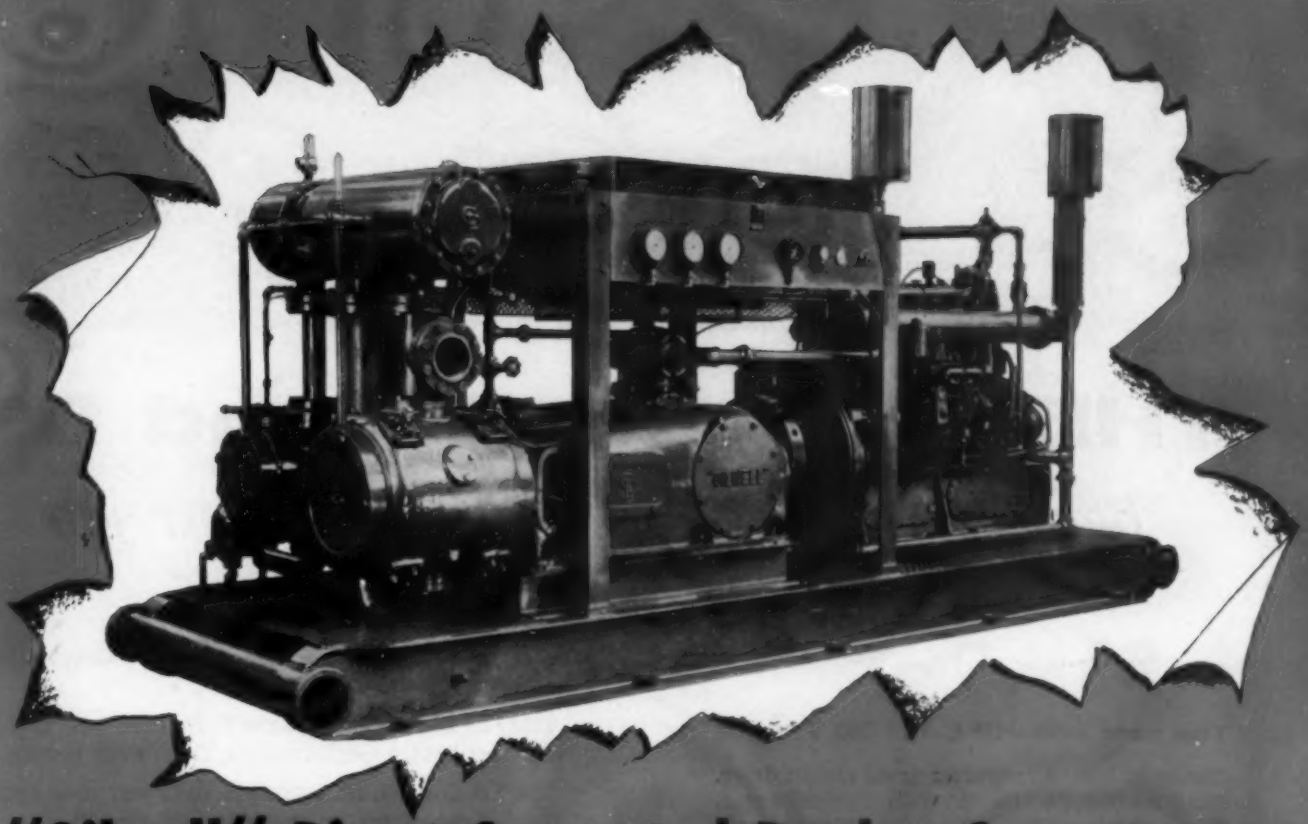
In the first place, population is increasing faster in the rest of the world. Moreover, many areas abroad are becoming more heavily industrialized, and are turning to mechanized farming and travel at a faster pace than ever before. Large increases in per capita consumption are being experienced.

Particularly dramatic possibilities for increased consumption exist in Western Europe, Latin America and Canada. Consumption of oil in these areas is expected to more than double during the next 20 years. In addition, consumption of natural gas in Western Europe, Canada and parts of Latin America will undergo sharp growth.

Therefore, it is indicated that pipe line construction outside of the U. S. will be at a much higher level in the future than has ever existed in the past.

Warren L. Baker

# NEW and BIGGER



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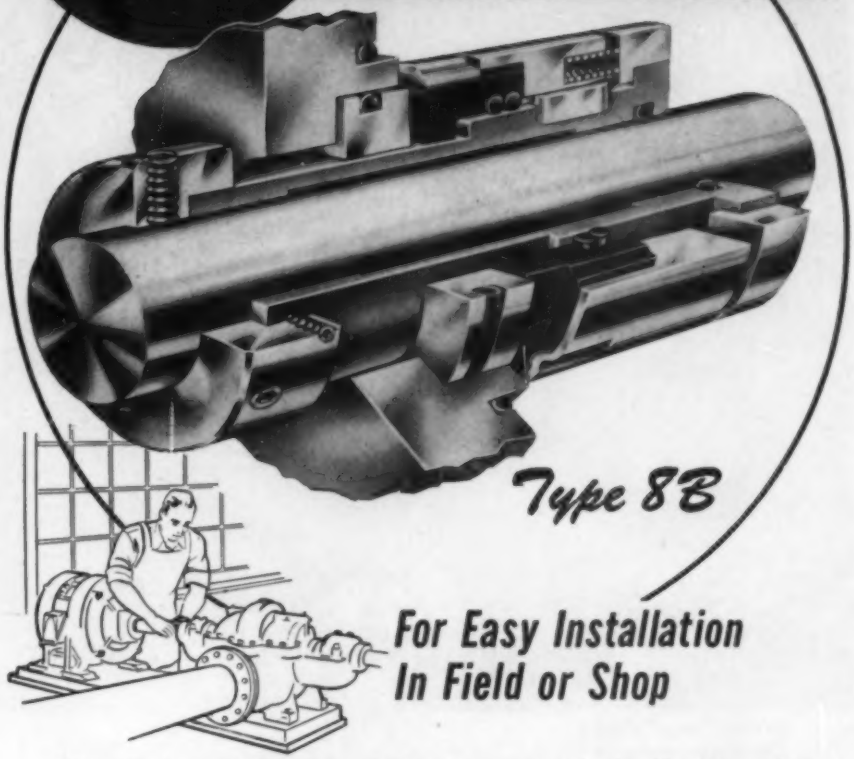

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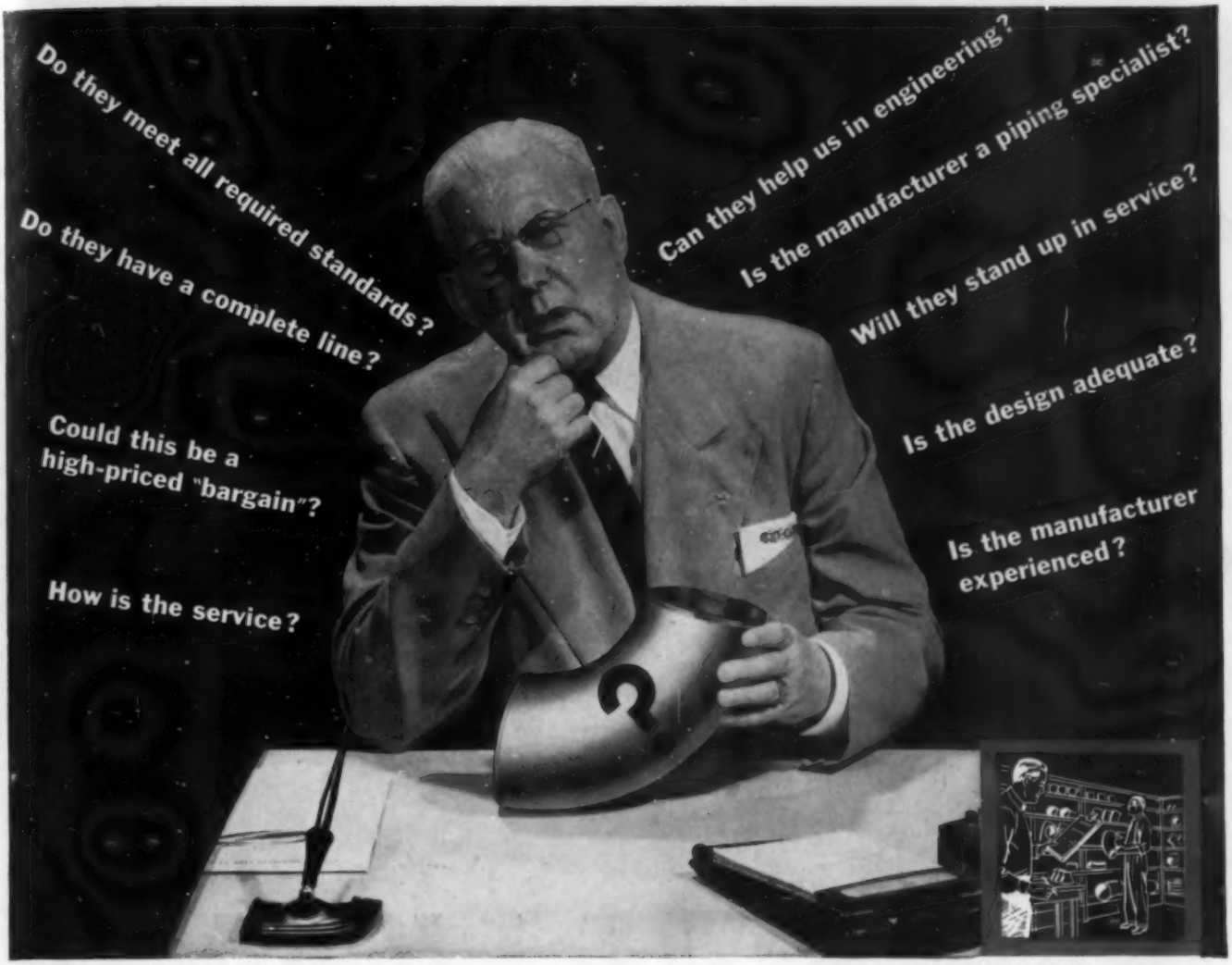
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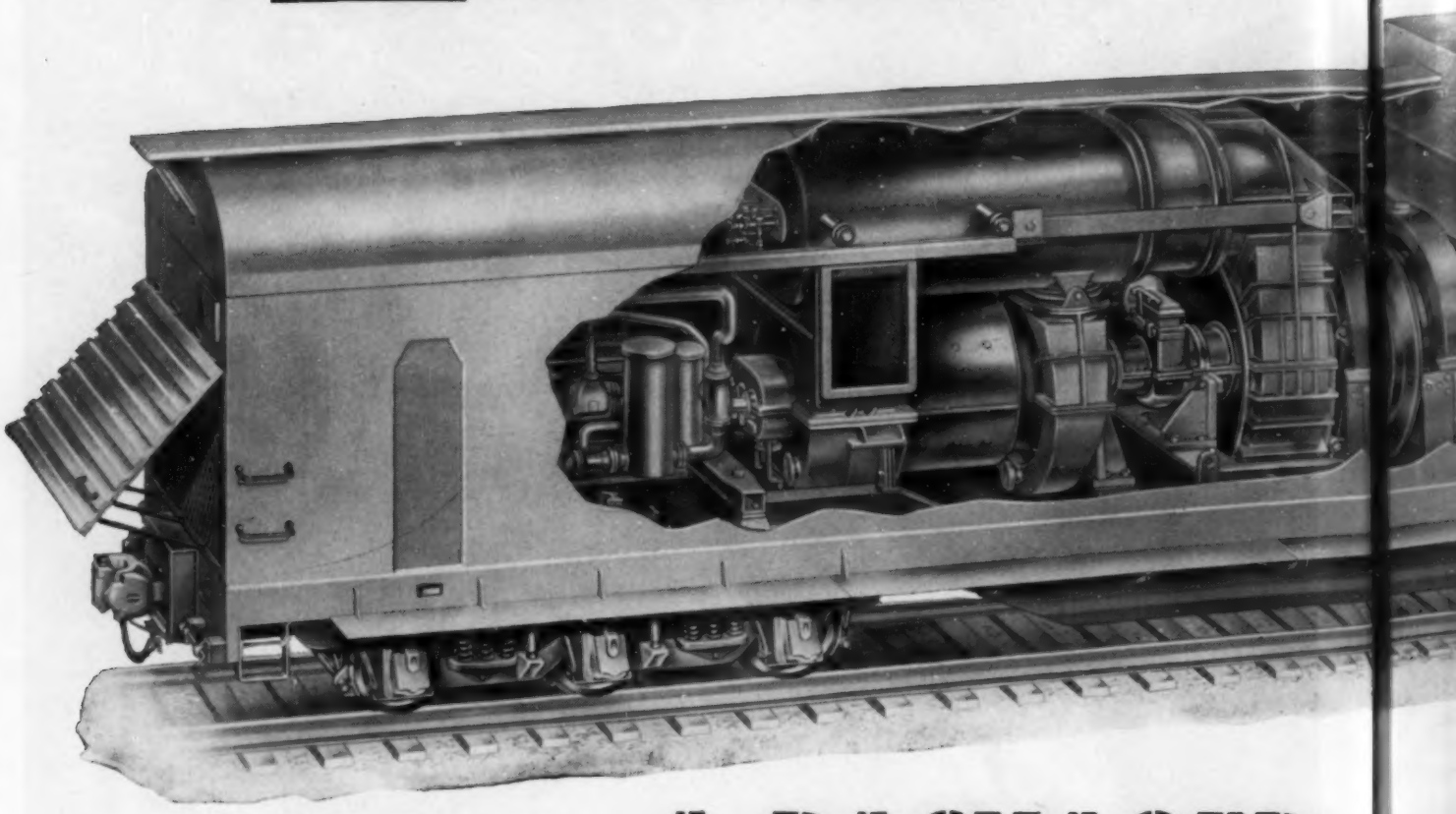

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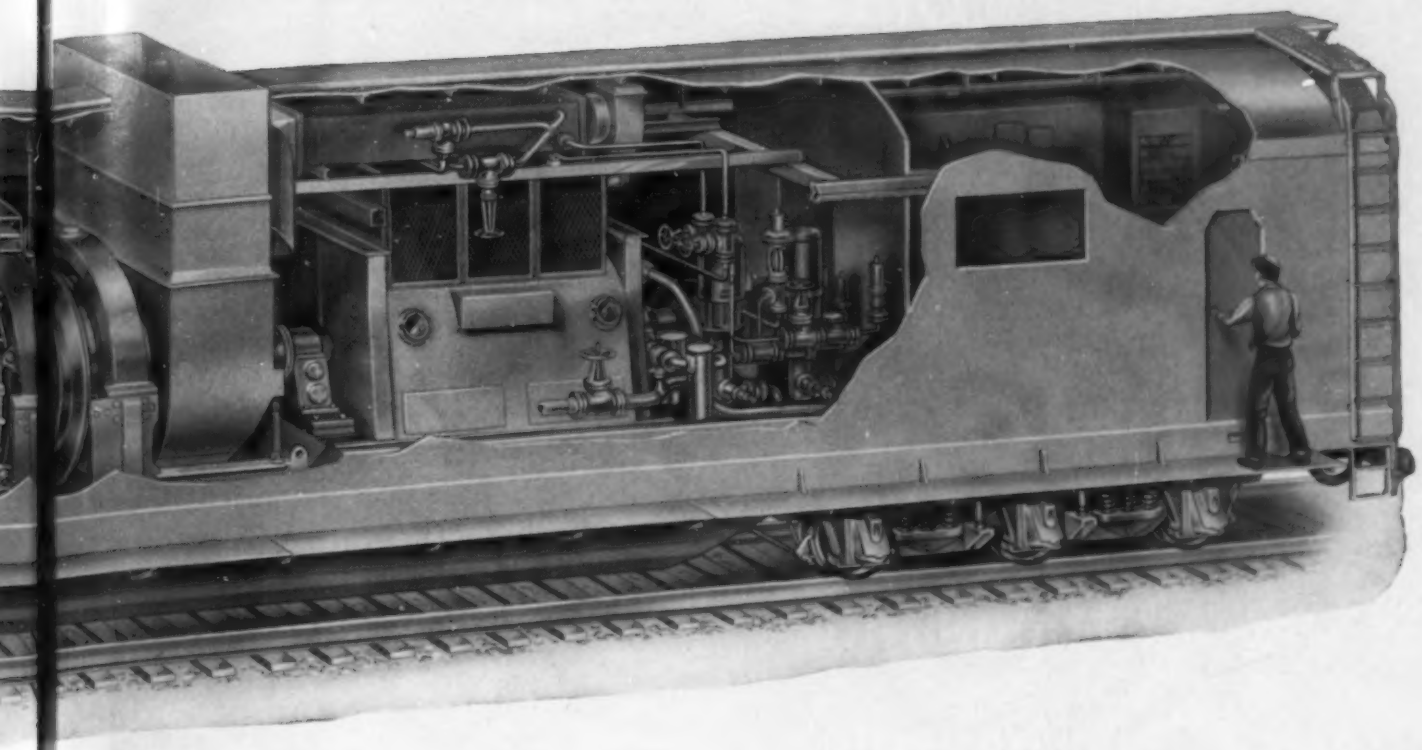

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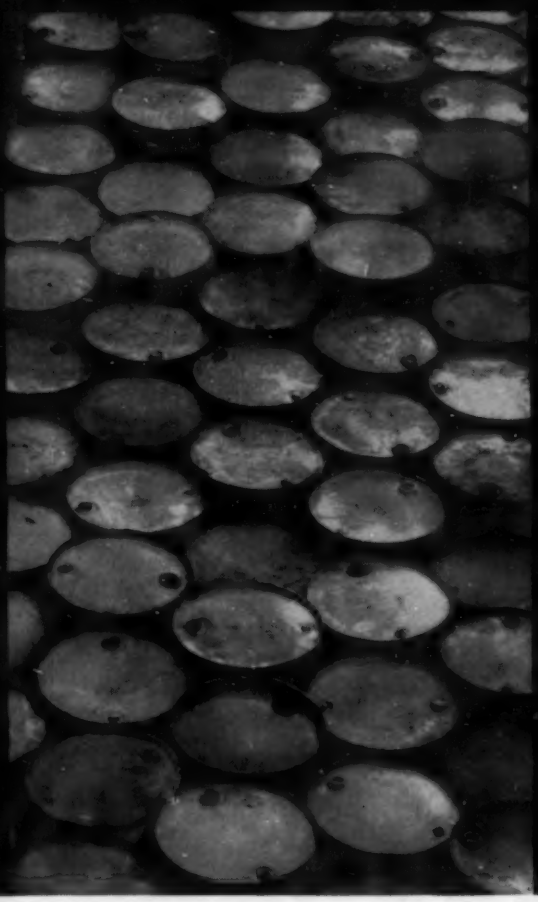

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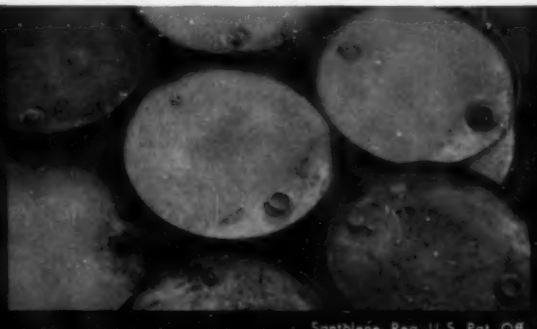

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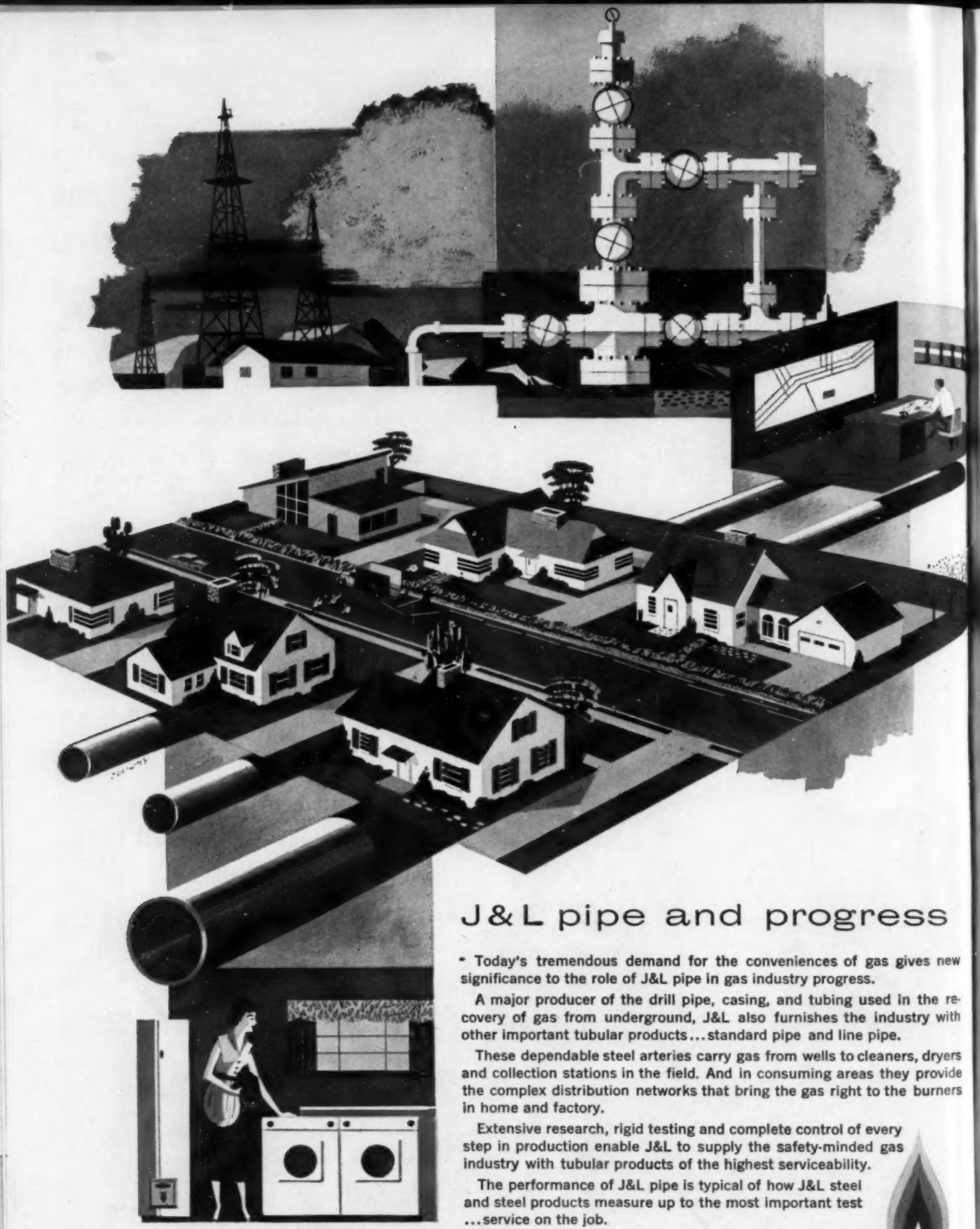

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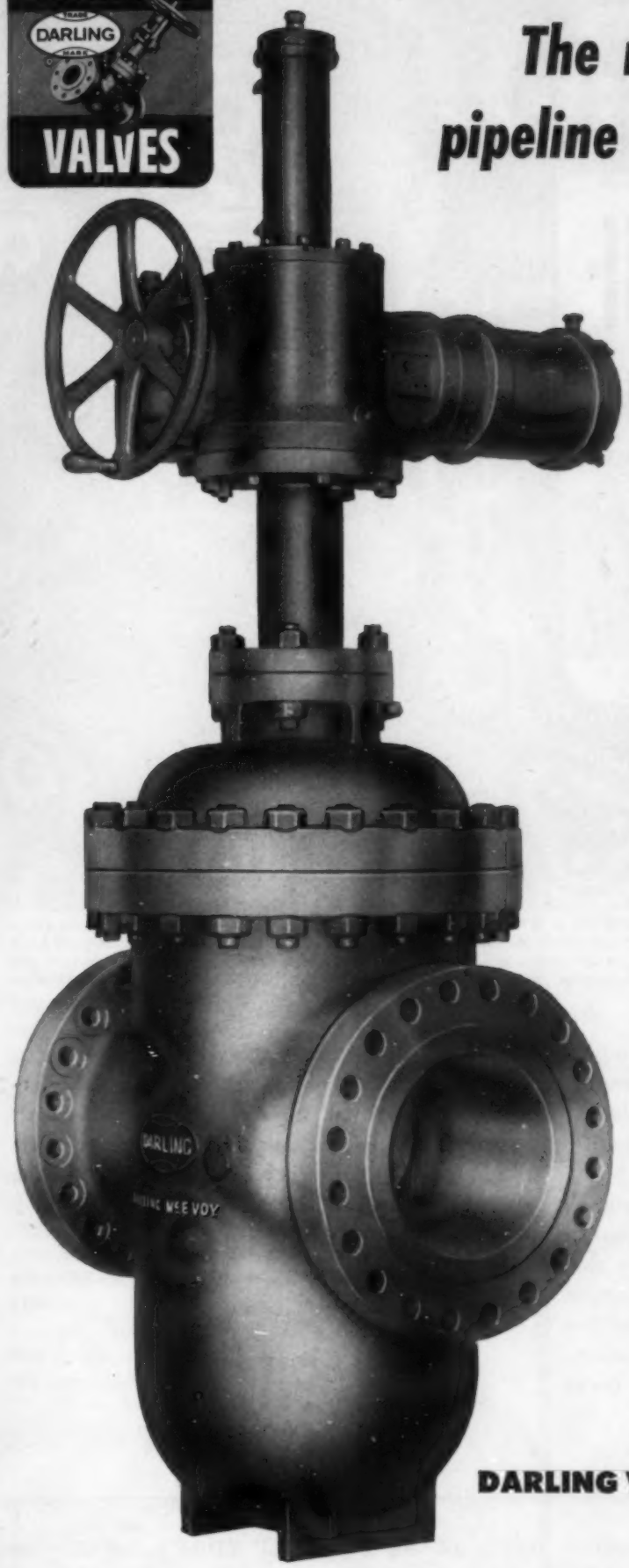


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Employing the time-tested McEvoy principle, two cylinders, filled with special sealant, are located within the valve. Both are operated by line pressure. Depending on the direction of flow, line pressure actuates one or the other of these cylinders to force sealant into a channel in the downstream face of the seat. Since these cylinders hold enough sealant for 50 or more closures, the valves need only periodic servicing for recharging with sealant.

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Ask for bulletin #5402 which contains complete information on the design and operation of this valve.

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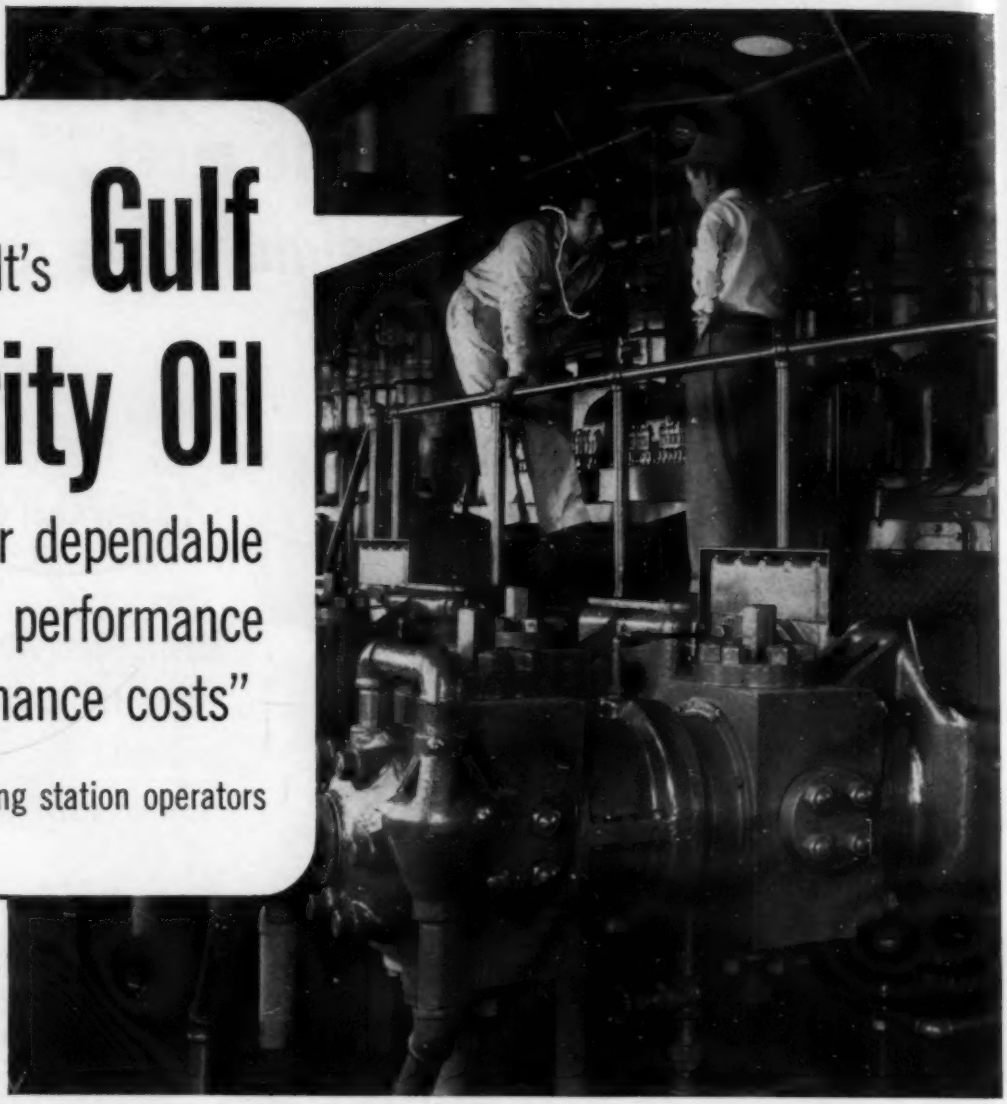
## for dependable gas compressor performance and low maintenance costs"

say pumping station operators



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

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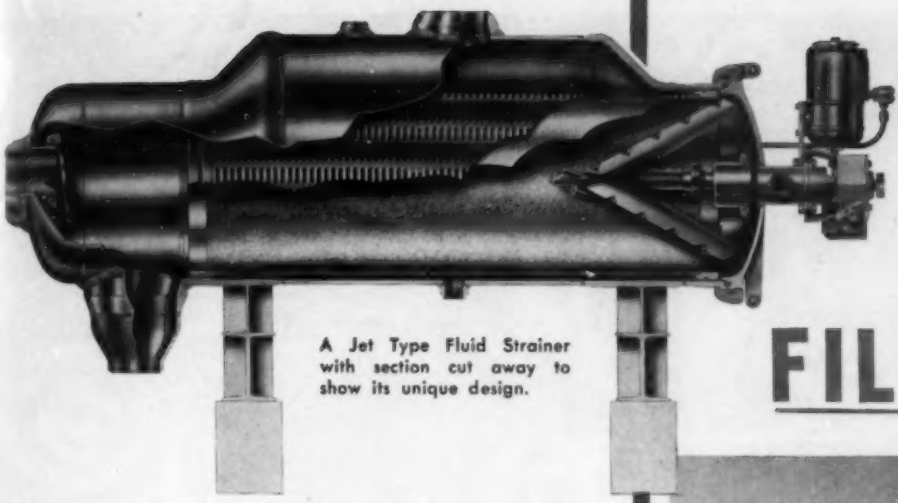
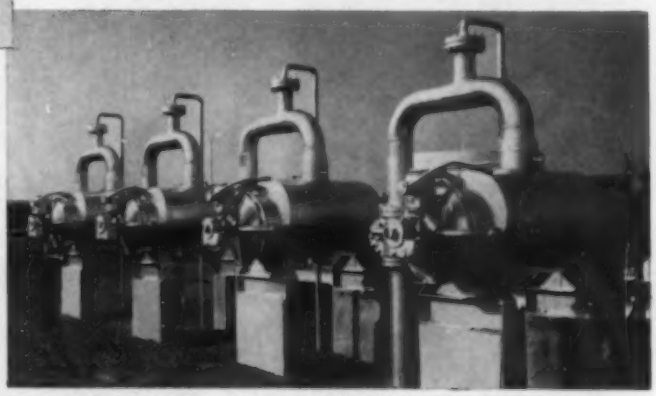


A Jet Type Fluid Strainer with section cut away to show its unique design.

# WHAT PRICE FILTRATION?

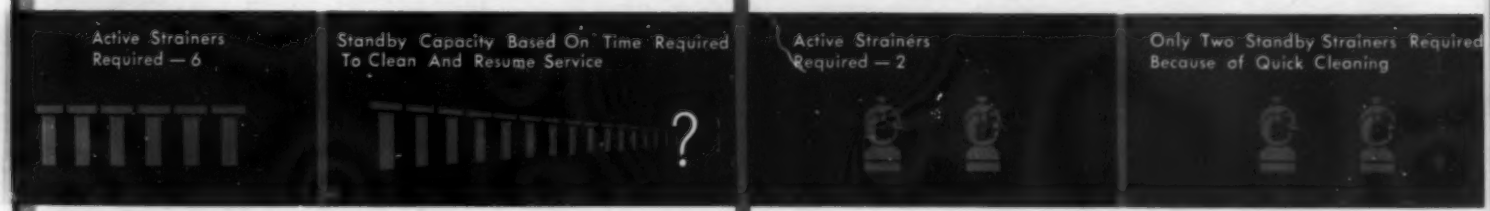


An installation of four, 30,000 bpd capacity Jet Type Strainers on a new products pipeline.

Let's examine two installations required to handle 60,000 bpd: One with conventional vertical sock type strainers of approximately 10 square feet of filter area each; the other with Jet Type Horizontal Strainers of approximately 30 square feet of filter area each.

Required: One square foot of filter area per 1,000 bbls. per day or a total of 60 square feet of filter area with **adequate** standby capacity to assure no by-passing, at any time, of dirty strainers, or pipeline shutdown time for cleaning strainers.

OBJECTIVE: **To filter all the product, all the time.***


Active Strainers Required — 6
Standby Capacity Based On Time Required To Clean And Resume Service
?
Active Strainers Required — 2
Only Two Standby Strainers Required Because of Quick Cleaning

### INSTALLATION REQUIREMENTS

1. Valves — 3 Per Strainer
2. Extensive Manifolding
3. Installation Labor — Maximum
4. Overhead Crane for Lifting Closure and Basket
5. Sump
6. No Recording Instruments

### STRAINER MAINTENANCE

1. Cleaning — Remove Closure and Replace Felt Manually. (Two Men 30 Minutes, 1 Man-Hour)
2. New or Reconditioned Felt Required for Each Cleaning
3. Replacement of Collapsed Strainer Elements Due to Excessive Pressure
4. No Automatic Operation Possible

*The expense of complete filtration is more than justified by the prevention of damage to closely fitted mechanical devices necessary to the operation of a pipeline.

### INSTALLATION REQUIREMENTS

1. Valves — 3 Per Strainer
2. Less Manifolding.
3. Less Installation Labor
4. No Overhead Crane
5. Sump
6. Pressure Differential Recording Gauge to Assure Daily Record of Pipeline Operation.

### STRAINER MAINTENANCE

1. Cleaning Accomplished By One Man in **Less Than 5 Minutes** Without Opening Strainer
2. Stainless Mesh Screen Lasts Indefinitely
3. Alarm System Prevents Damage to Strainer Element Due to Excessive Pressures
4. Can Be Made Fully Automatic

### ADDITIONAL OPERATING ADVANTAGES OF JET STRAINERS

1. Stream can be cleaned to any desired degree — 100, 200, 325, or 400 mesh screens optional.
2. Can be made fully automatic for operation at remote station.
3. Greater Safety — Strainer is cleaned without opening, consequently workmen are not subjected to danger of fumes and fire.

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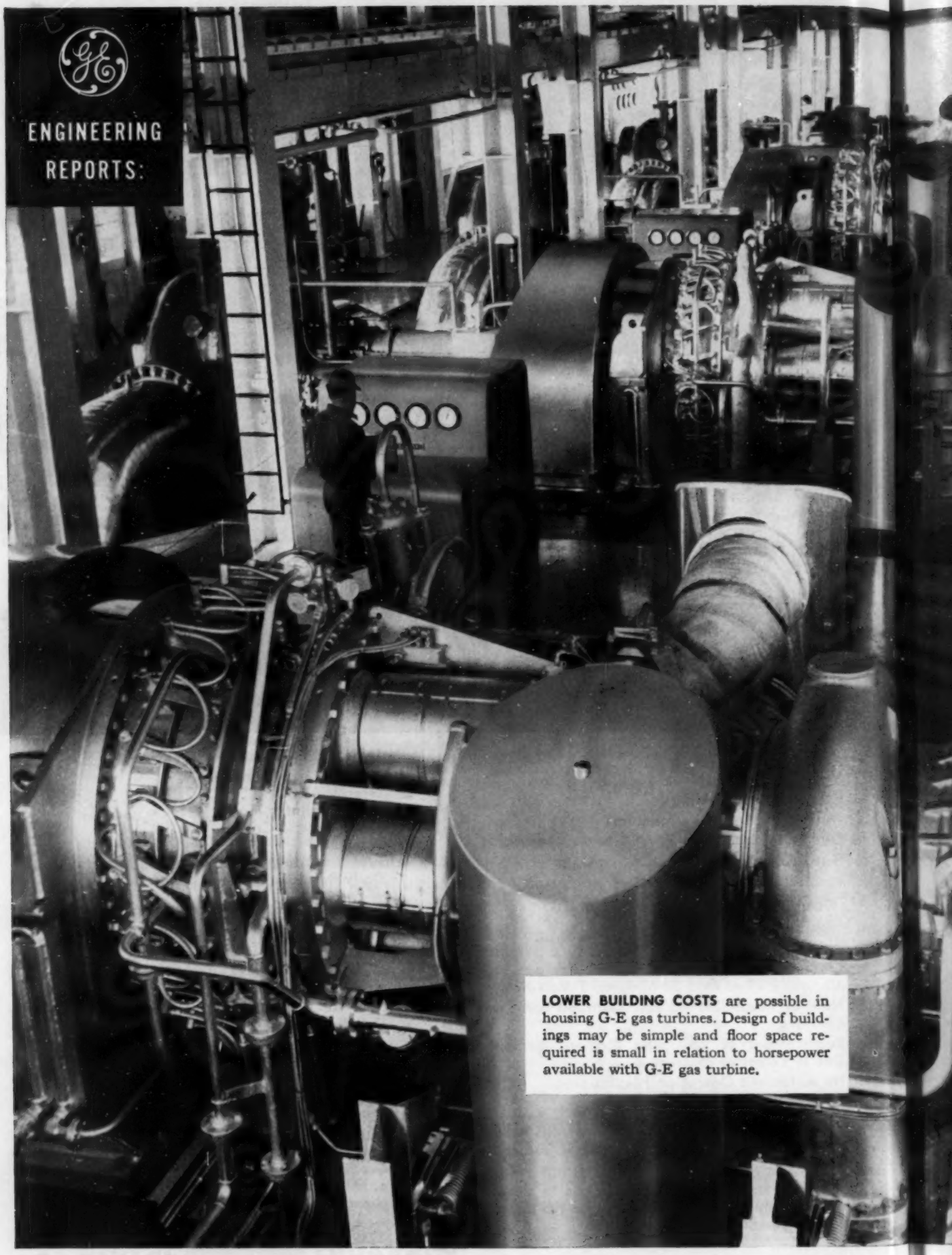
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## 8 G-E gas turbines for Northern Natural Gas give up to

# 25% MORE HP FOR PEAK LOADS

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These complete, economical prime movers have this fundamental characteristic: horsepower increases as ambient temperature decreases. Thus, during cold weather, when demand is greatest, up to 25% more power may be delivered.

Proven economies of operation and maintenance explain why many natural gas pipeline stations are being planned for G-E gas turbines. Have you investigated their many advantages?

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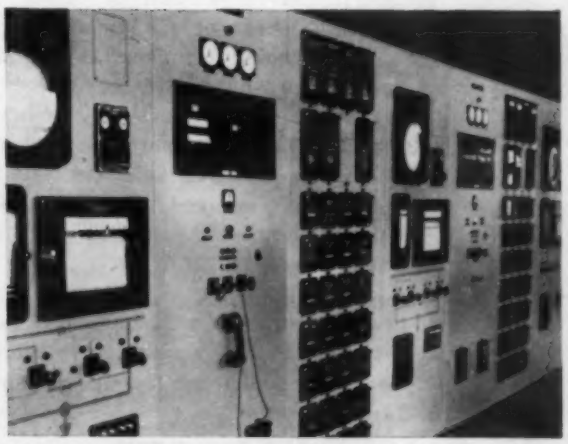
**Combustion Gas Turbines for the Gas Pipeline Industry—Backed by over 50 years of Turbine Leadership**

# GENERAL ELECTRIC



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*Special Alloys* **and now...** *PLASTICS!*

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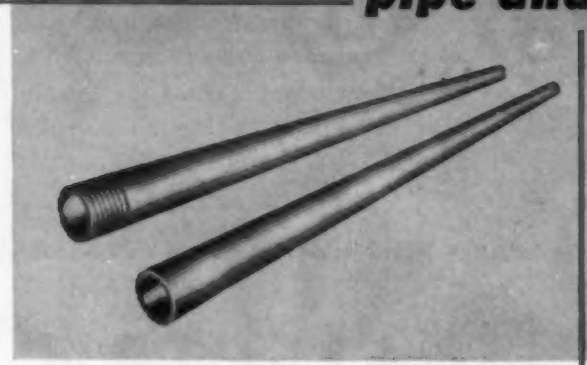
## *pipe and fittings*



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# WHO'S MEETING WHERE

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|---|---|
| OCT. 2- 5 | American Institute of Mining and Metallurgical Engineers, Petroleum Branch, Roosevelt Hotel, New Orleans. |
| 2- 6 | American Society for Testing Materials D-2, Petroleum Products and Lubricants, Statler Hotel, Washington. |
| 3- 4 | Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas. |
| 3- 4 | Gas Measurement Institute, University of Kansas and Southwest Kansas Petroleum Industry, Legion Hall, Liberal, Kansas. |
| 3- 7 | American Institute of Electrical Engineers, Morrison Hotel, Chicago. |
| 9-15 | American Petroleum Institute, Oil Progress Week. |
| 12-14 | National Association of Corrosion Engineers, Permian Basin Corrosion Tour, Lincoln Hotel, Odessa, Texas. |
| 13-14 | California Natural Gasoline Association, Ambassador Hotel, Los Angeles. |
| 14-15 | National Society of Professional Engineers, Peabody Hotel, Memphis, Tenn. |
| 17-19 | American Gas Association and Pacific Coast Gas Association, Ambassador, Biltmore and Statler Hotels, Los Angeles. |
| 17-21 | National Safety Congress, National Safety Council, Chicago. |
| 18-20 | American Institute of Electrical Engineers (Motor Applications and Problems in Heating and Cooling Conference), St. Louis. |
| 18-21 | National Association of Corrosion Engineers, South Central Regional Meeting, Shamrock Hotel, Houston. |
| 21-23 | First Cuban Congress on Petroleum, Sponsored by Universidad de Oriente (University of Oriente), Santiago de Cuba. |
| 24-26 | American Standards Association, Annual Meeting, Sheraton Park Hotel, Washington, D.C. |
| 24-27 | National Association of Railroad and Utilities Commissioners, Natural Gas Panel Discussion, Asheville, N.C. |
| 24-28 | American Society of Civil Engineers, Statler Hotel, New York. |
| 27-29 | Rocky Mountain Oil & Gas Association, Cosmopolitan Hotel, Denv |
| 28 | Natural Gasoline Association of America, Southern Regional Meeting, Captain Shreve Hotel, Shreveport, La. |
| 31-Nov. 1 | Independent Petroleum Association of America, Jefferson Hotel, St. Louis. |
| NOV. 1- 3 | *National Association of Corrosion Engineers, Northeast Regional Meeting, Hotel Niagara Falls, Niagara Falls. |
| 2- 4 | Society of Automotive Engineers, Diesel Engine Meeting, Chase Hotel, St. Louis. |
| 3- 4 | Annual Instrumentation Conference, School of Engineering, Louisiana Polytechnic Institute, Ruston, La. |
| 13-18 | American Society of Mechanical Engineers, 75th Anniversary Meeting, Hilton and Blackstone Hotels, Chicago. |
| 14-17 | American Petroleum Institute, Annual Meeting, Mark Hopkins, Fairmont, St. Francis and Palace Hotels, San Francisco. |
| 14-17 | Automation Exposition and Symposium on Electronic Computers, Navy Pier, Chicago. |
| DEC. 1- 3 | Interstate Oil Compact Commission, Annual Winter Meeting, LaFonda Hotel, Santa Fe, N.M. |
| 8- 9 | American Petroleum Institute, OIIC Meeting, Waldorf-Astoria Hotel, New York. |
| 1956 JAN. 16-18 | Pipe Line Contractors Association, 8th Annual Convention, Boca Raton Hotel and Club, Boca Raton, Fla. |

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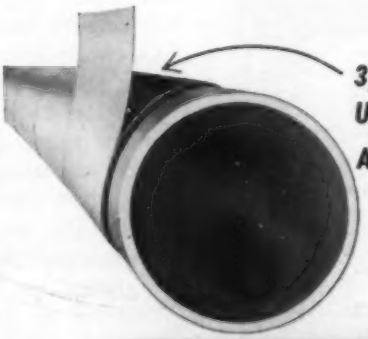

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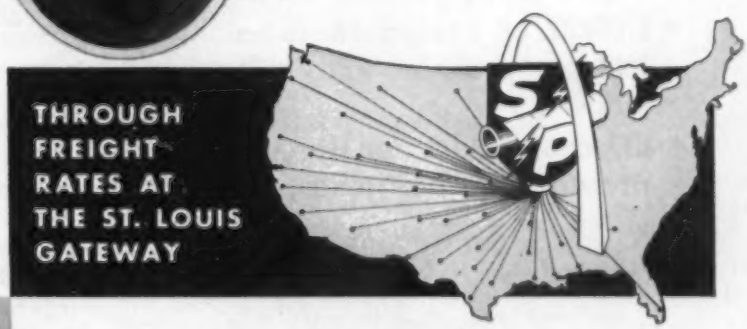


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# Getting the Most for your Flange Dollar Using "O" Rings

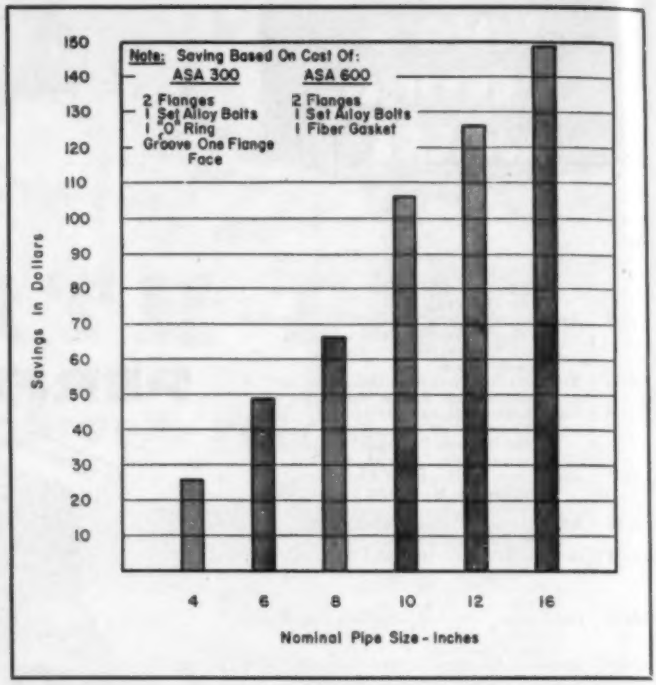
**TESTS** have shown: a 300 ASA flat face flange with an "O" ring is better for cold pressure service than a 600 ASA joint flange up to 12-inch sizes.

**THE REASON:** the "O" ring flange requires little bolt tension and less stress is carried over to the piping system.

## TEST PROCEDURE USED

The purpose of the tests was to evaluate:

- Maximum operating pressures.
- Effects of initial bolt loads.
- Effect of raised-face on leakage pressure and bolt loads.
- Effect of flat-face on leakage pressure and bolt loads.




**GRAPH 1—Dollar Saving-ASA 300 flanged joint vs. ASA 600 flanged joint.**

**By E. C. SCHUSTER and V. L. RUPE,**
Service Pipe Line Company

A NUMBER OF EXCELLENT articles have appeared on the theoretical evaluation and practical design considerations for bolted joints. While these articles have increased our knowledge of the effective use of flanges, many questions about design and performance of various flange-and-gasket combinations remain unanswered.

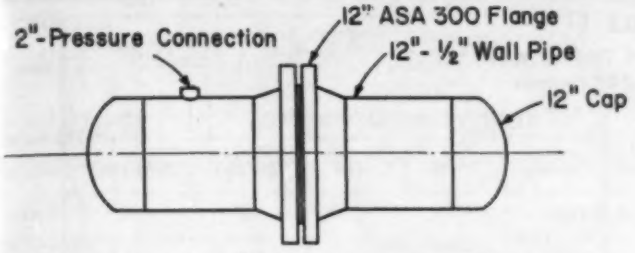
The synthetic rubber "O" ring is one gasket type usually considered only for high pressures. Neither the "Code for Pressure Piping" nor the "Code for Unfired Pressure Vessels" include the "O" ring in their gasket-data tables. In fact, little data is available on the use of "O" rings in flanged joints.

Operating temperatures rarely exceed 100° F. in crude oil pipe line service. The welding-neck flange is the accepted standard for flanged joints. "O" rings and similar synthetic rubber pressure-seal gaskets have performed well in quick-opening scraper-trap closures. These facts led us to believe that the "O" ring could be successfully and economically applied as a gasket in flanged joints.

To develop the feasibility of using "O" rings in place of standard flat gaskets, a two-phase program was initiated.

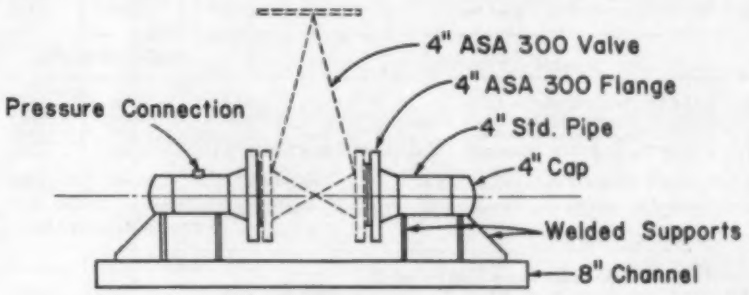
We first approached the problem theoretically by using the methods of calculation developed by E. O. Waters, D. B. Rossheim, D. B. Wesstrom and F. S. G. Williams in their paper "Formula for Stresses in Bolted Flanged Connections."[1] We calculated the theoretical stresses developed in the 12-inch ASA welding-neck flanged joint using an "O" ring gasket. Calculations were based on an allowable 17,500 psi flange stress and were made for ratings from ASA 150 through ASA 600. Our results showed that the ASA 300 series flanged-joint could be advanced safely to a working pressure rating of 1200 psi at 100° F. and remain within all API-ASME allowable stress ranges.

Satisfied from these results that our prognostication




Note: Face Of One Flange Grooved For "O" Ring

Figure 1




Note: Face Of One Flange In Each Joint Grooved For "O" Ring

Figure 2

was correct, we undertook the second phase of our program. This consisted of a series of hydrostatic tests using a 12-inch series 300 welding-neck flange assembly modified to use an "O" ring gasket. In these tests, we evaluated the effects of internal pressure, bolt loads and flange-face design on the magnitude of stresses existing in the flanges and bolts.

Our test results were gratifying in that they bore out our original hypothesis. Previously, we ran tests under similar conditions using a 12-inch ASA 300 flanged assembly and various regularly accepted flat gaskets. The performance of the "O" ring gasketed flanged joint was far superior to any previously tested. From the "O" ring test results, we concluded that:

1. By the use of an "O" ring, the ASA 300 raised or flat-face flanged joint, 12 inches and under in size, can be given a cold-service pressure rating equal to the ASA 600 ring joint. (Theoretical calculations indicate that this uprating can apply through the 16-inch size. However, wo do not propose this until further tests on larger sizes are completed.)
2. With an "O" ring seal, only sufficient bolt load should be applied to mate the flange faces and to prevent relaxation from vibration, surges, etc. Excessive bolt loads are a detriment to the efficient operation of the joint. Alloy steel bolts should be used in all installations.
3. Because of lower over-all stress level in the flanges and adjacent piping, a flat-race flange is preferred. This allows a lighter flange to be used which is more commensurate with the design of the piping system. The heavier raised-face flanges now used transmit more of the thermal, vibrational and misalignment stresses to the weaker piping system.
4. The "O" ring groove should be placed as close as possible to the inside diameter of the flange. A practical limit would be:

   ID of the "O" ring groove = ID of flange plus two times diameter of "O" ring.
5. The "O" ring is easier to place in a fixed manifold joint than is the regular steel ring of the standard ring-joint.
6. The potential savings in up-rating flanges by using "O" rings make the use of this joint worth consideration.

**Test Equipment.** The tests were conducted with two test headers. First, a 12-inch unit, (Figure 1) was used to determine the ability of the "O" ring to effect a tight joint. Second, a 4-inch fabrication (Figure 2) was used to determine possible difficulties in installing a valve into a fixed manifold and its pressure-carrying ability after bolting up.

**Test Procedure.** The purpose of the tests was to evaluate:

1. Maximum operating pressures
2. Effects of initial bolt loads
3. Effects of raised-face on leakage pressure and bolt loads
4. Effects of flat-face on leakage pressure and bolt loads
5. Installation difficulties in a fixed manifold

Tests were run, using two raised-face flanges; a raised-face flanged header with a raised-face blind flange; two flat-face flanges; a flat-face flange and a flat-face blind.

To prevent undue distortion of the flanges, we held the maximum hydrostatic test pressure to approximately 3500 psi. On the last test, the test unit was carried to failure.

Two tests were run with the fixed manifold. In the first test, the distance between the flanges was held to the face-to-face dimension of a 4-inch ASA 300 raised-face valve. In the second test, this distance was increased ⅛-inch.

**Analysis of test data.** Table 1 shows a summary of

## TABLE 1

**Summary of Test Data**
**ASA 300 — 12" Flanges**

| Test No. | TEST UNIT DESCRIPTION | Gasket Description | Initial[2] Bolt Stress | MAXIMUM CONDITIONS OBTAINED | | | | STRESS LEVEL AT 2160 Psi PRESSURE | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Internal Pressure | Bolt Stress | Flange[3] Stress | Flange Condition | Bolt Stress[5] | Flange Stress[6] |
| | **Tests with "O" Ring Gaskets** | **RAISED-FACE FLANGE** | | | | | | | |
| 1 | 2-ASA 300 Flanges (Raised Face) | "O" Ring (13.530" I.D.) | 8,900 | 3,000 | 45,440 | 44,500 | No Failure (Flange Face Distortion of .007") | 28,450 | 32,280 |
| 2 | 2-ASA 300 Flanges (Raised-Face) | "O" Ring (13.530" I.D.) | 18,260 | 3,450 | 39,080 | 39,820 | | 21,550 | 25,390 |
| 3 | 2-ASA 300 Flanges (Raised-Face) | "O" Ring (13.530" I.D.) | 25,560 | 3,650 | 36,920 | 38,310 | | 14,220 | 18,050 |
| 4 | ASA 300 Flange & Blind (Raised-Face) | "O" Ring (13.530" I.D.) | 26,400 | 3,700 | 49,020 | 48,820 | | 19,400 | 23,230 |
| 5 | ASA 300 Flange & Blind (Raised Face) | "O" Ring (13.530" I.D.) | 26,000 | 3,450 | 38,200 | 39,060 | | 17,240 | 21,080 |
| | | **FLAT-FACE FLANGE** | | | | | | | |
| 6 | 2-ASA 300 Flanges (Flat-Face)[1] | "O" Ring (13.530" I.D.) | 10,200 | 3,500 | 51,800 | 17,090 | No Failure (No measurable Flange Face Distortion) | 36,000 | 11,880 |
| 7 | 2-ASA 300 Flanges (Flat-Face)[1] | "O" Ring (13.530" I.D.) | 26,900 | 3,500 | 62,000 | 20,460 | | 41,520 | 13,700 |
| 8 | ASA 300 Flange & Blind (Flat-Face) | "O" Ring (13.530" I.D.) | 11,360 | 3,500 | 49,700 | 16,400 | | 34,520 | 11,390 |
| 9 | ASA 300 Flange & Blind (Flat-Face) | "O" Ring (13.530" I.D.) | 24,200 | 3,600 | 66,740 | 22,020 | | 44,520 | 14,690 |
| 10 | 2-ASA 300 Flanges (Flat-Face) | "O" Ring (13.530" I.D.) | 10,940 | 4,750 | Over 50,000 | Over 17,000 | Leakage | 32,890 | 10,890 |
| | | **RAISED-FACE FLANGE** | | | | | | | |
| Average of 8 Tests with ASA 300 Flange & Blind (Raised-Face) | | Spirotallic with Retainer | ..... | 1,480 | 52,000 | 47,200 | Leakage | ..... | ..... |
| Average of 2 Tests with ASA 300 Flange & Blind (Raised Face) | | Compressed Fiber | ..... | 1,200 | 58,000 | 52,000 | Leakage | ..... | ..... |

[1] Flat-Face Flanges are standard Flanges with the Raised-Face removed.
[2] All bolt stresses are based on measured bolt elongation.
[3] All Raised-Face flange stresses are based on API-ASME Code 1951.
[4] All Flat-Face flange stresses are based on Ranking Theory as proposed in "Piping Handbook—1945".
[5] 4140 Bolt: Minimum yield 105,000 psi—API-ASME design allowable 20,000 psi.
[6] Flange: Minimum yield 36,000 psi.—API-ASME design allowable 17,500 psi.

test data. Stress values shown are based on the API-ASME code formulas for raised-face flanges. Since these formulae exclude all cases where there is any flange contact outside of the bolt circle, the stresses for flat-face flanges were calculated with formulae derived from the Rankine stress theory. Bolt stresses were calculated from deformation under load.

In the normal raised-face flange assembly using a flat gasket, high initial bolt loads are necessary to place the proper crush on the gasket for pressure seal. This results in high flange-stress levels. Table 1 shows the value of these bolt-loads taken from previous tests. With the application of hydrostatic pressure, the bolt load and flange stress reduce because of flange rotation. This flange rotation produces excessive stress in the adjacent pipe wall. With additional internal pressure, the bolt load again increases and reduces the compression in the gasket to a point where leakage occurs.

With an "O" ring replacing the flat gasket, essentially the same sequence occurs when hydrostatic pressure is applied, with the exception that the force required to compress the "O" ring in the groove is negligible and initial bolt loads are small. This results in lower initial flange stresses, reduced flange rotation and lower stresses in the adjacent pipe walls. The seal is lost when the flanges separation is enough to extrude the "O" ring.

When flat-face flanges are used, a small initial bolt load is necessary to bring the flanges together and to prevent relaxation from vibration and surge. Additional initial bolt load is unnecessary and only raises the stress level of the unit. Since the flanges have metal-to-metal contact, the hydrostatic pressure tends to rotate the flange about its outer edge, but to a lesser degree than with raised-face flanges. This results in a continually increasing bolt and flange stress to the point of flange separation sufficient to cause leakage. In the flat-face flange assembly, leakage occurred at 4750 psi.

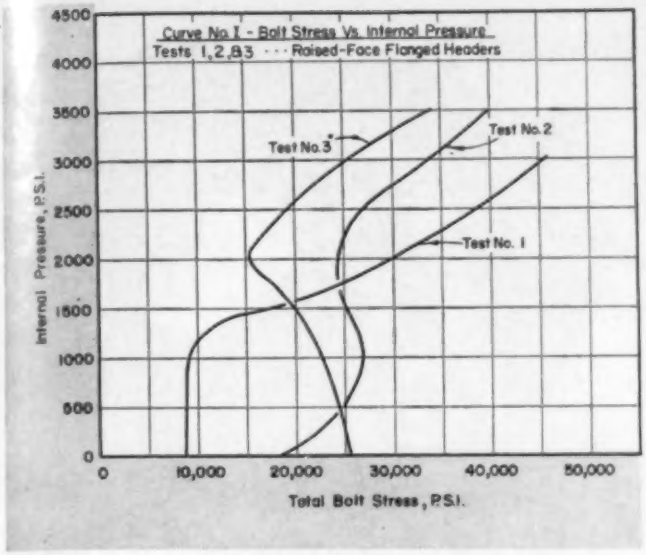
The flange material (SA 181-49 Grade II) has a minimum yield of 36,000 psi, and an allowable code design stress of 17,500 psi. Table I shows that all flat-face flange stresses are less than the allowable at a hydrostatic pressure of 2160 psi. At the same pressure, the raised-face flange stresses are all over the 17,500 psi allowable but below the minimum yield.

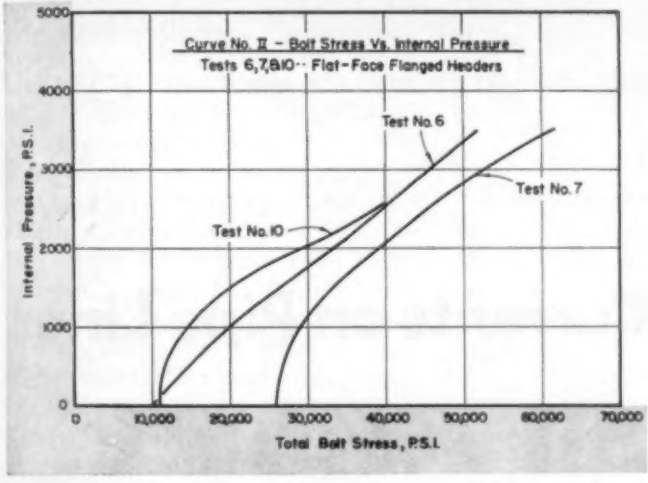
The bolt material (SA-193-49T-Grade B7) has a minimum yield of 105,000 psi and an allowable code design stress of 20,000 psi. At 2160 psi, the stress level of the bolts in the raised-face flange is close to the code allowable, but well below the yield point. In a flat-face flange these stresses are substantially higher, but well below the yield of 105,000 psi. A comparison of the data indicates that the flat-face flange with a minimum initial bolt load is preferred because of its over-all lower stress level and decreased flange rotation.

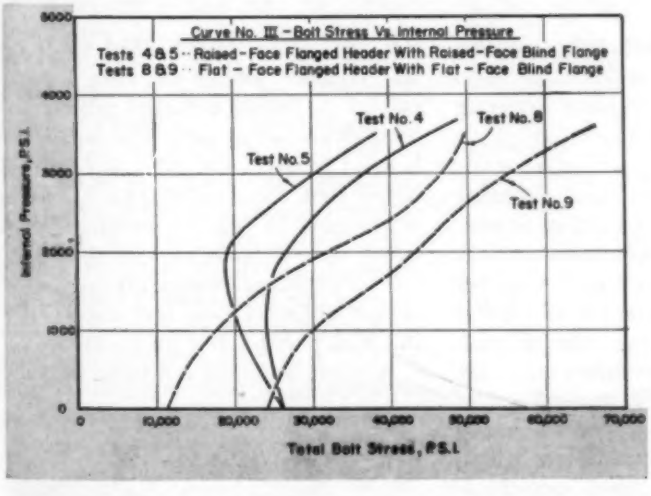
Although no fatigue or distortion tests were made, literature discloses that a series of fatigue tests on full-sized assemblies permitted the following conclusions:[2]

1. Under unusual, severe bending stresses, raised-face flange assemblies do not fail in the flange proper, by fracture of the bolts, or by leakage across the joint face.
2. Failure occurs almost always in the pipe adjacent to the flange and in rare instances across an unusually weak attachment weld.
3. The endurance strength of a welding-neck flange assembly is equivalent to that of a butt-welded joint between two pieces of pipe.

The raised-face tests to 3500 psi resulted in a measurable flange face distortion of .007 inch for each flange. In the flat-face flange test, 3500 psi interval pressure pro-


Curve No. I - Bolt Stress Vs. Internal Pressure
Tests 1, 2, & 3 ··· Raised-Face Flanged Headers
Test No. 3
Test No. 2
Test No. 1
Internal Pressure, P.S.I.
Total Bolt Stress, P.S.I.


Curve No. II - Bolt Stress Vs. Internal Pressure
Tests 6, 7, & 10 ·· Flat-Face Flanged Headers
Test No. 6
Test No. 7
Test No. 10
Internal Pressure, P.S.I.
Total Bolt Stress, P.S.I.


Curve No. III - Bolt Stress Vs. Internal Pressure
Tests 4 & 5 ·· Raised-Face Flanged Header With Raised-Face Blind Flange
Tests 8 & 9 ·· Flat - Face Flanged Header With Flat - Face Blind Flange
Test No. 4
Test No. 8
Test No. 5
Test No. 9
Internal Pressure, P.S.I.
Total Bolt Stress, P.S.I.

duced no measurable face distortion. After the test to failure, the face distortion was .040 inch per flange and the bolts had taken a permanent set.

The test on the 4-inch manifold section was carried to 5500 psi before bonnet-joint leakage occurred in the ASA 300 valve. No difficulties were encountered in assembling the unit. Further tests have been proposed to evaluate stresses in a 20-inch valve body to determine the limit of uprating the valve itself as part of the flanged manifold section.

A comparison of bolt stress versus internal pressure is shown by Curves I through III for the various test combinations.

## About the Authors

EDWIN C. SCHUSTER, engineer in the Research and Development Section at Service Pipe Line Company, received his B.S. degree in mechanical engineering from Marquette University in 1945. He joined the War Emergency Pipeline, Inc. immediately after graduation as an engineer under the pump station supervisor. In 1946 after operations of the Big and Little Inch pipe lines were suspended, he joined the faculty of Marquette University as an instructor in mechanical engineering. He became associated with Service in 1951. He is a registered professional engineer in Wisconsin.

V. L. RUPE, who graduated in 1934 from Oklahoma A&M College with a B.S. degree in mechanical engineering, was with Reed Roller Bit Company eight years and in general machine and welding shop management and operation four years prior to joining Stanolind Pipe Line Company in 1947. In 1950 he was made engineer in the mechanical section of Service Pipe Line, formerly Stanolind. At present he is concerned with pump station design, economics of station machinery selection, specifications for and selection of machinery and mechanical construction materials.

**Economics.** The comparative cost of ASA 300 and ASA 600 raised face flanges is:

| Size | COST PER FLANGE ASA 300 | ASA 600 | Saving |
|---|---|---|---|
| 10 | $21 | $ 71 | $50 |
| 12 | 37 | 96 | 59 |
| 16 | 92 | 161 | 69 |

The average cost of machining the "O" ring groove in one flange of a joint is about $3 in sizes 10-inch through 16-inch. Bar graph I shows the savings possible if ASA 300 flanges are used rather than ASA 600.

**Closure.** We consider it safe and practical to uprate flanged joints in cold service by using "O" rings. We know that it is economical.

"O" rings of synthetic materials that are resistant to hydrocarbons and age deterioration are now available.

We recognize certain limitations. For instance, this joint will not be satisfactory where insulating flanges are required.

We do not consider the fire hazard as serious, since there remains a metal-to-metal secondary-seal against excessive leakage.

In fact, we venture to say that, someday soon, manufacturers' standards and governing codes will recognize this type of joint for cold service. This should result in a new flange design of light section and small diameter—pound-for-pound twice as efficient as the present standard.

ACKNOWLEDGMENTS

The authors wish to acknowledge the initial work done on this development by Charles Wheatley of Tulsa as well as the assistance of their fellow employes in conducting these tests.

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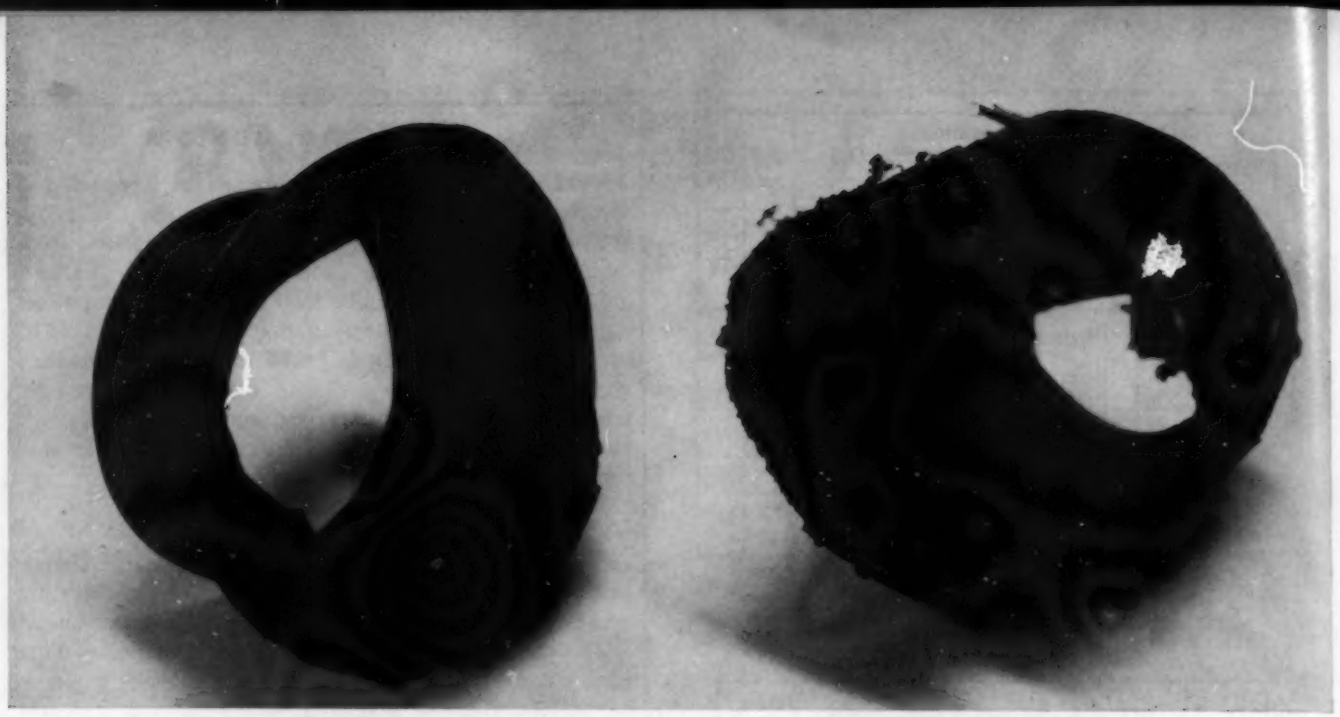
[2] "Fatigue Tests on Flanged Assemblies," by A. R. C. Markl and H. H. George, *ASME Transactions* (1949).



Coupling insulation thought to be destroyed by lightning in combination with current from power line.

*What can be done about . . .*

# Lightning and Induced Currents on Pipe Lines

**By JAMES R. COWLES,**
Consulting Engineer, Tulsa

THE EXISTENCE of undesirable currents in pipe lines has been common knowledge for years. What to do about them is the pressing problem. These currents come from lightning, power line surges, power line neutrals, and to a slight extent from telephone grounds.

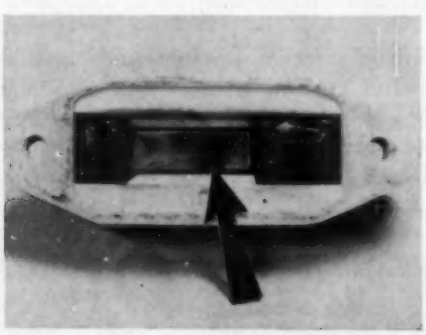
Until the corrosion engineer appeared in the pipe line industry, there was no thorough study of this problem. Even now, since the currents being studied are generally variable and often occur at infrequent intervals, progress is slow. But here are some new developments.

**Lightning.** Currents from lightning on bare lines are not so apparent, except when a direct stroke occurs. Then holes may be burned in a line near a power line ground or similar attractive point of entrance or exit. Such damage is rare, however.

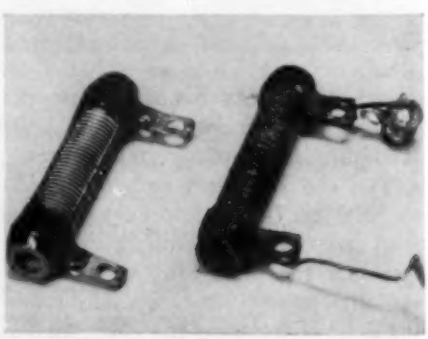
On old, coated lines more frequent evidence is seen. At least once, pipe to soil voltages on a gas distribution system have been observed to drop drastically during a thunderstorm. This drop was not momentary but for the duration of the storm.

On well coated and insulated lines damage to equipment is frequent and obvious. One author correlated flange insulation damage by lighting and/or power surges with coating quality, the greatest rate of damage being found on well coated lines. The author has observed that rectifier damage, often only burned spots on the rectifier stacks or case, occurs mostly on small rectifiers which are used of course in cases where coating is good to excellent. Also, it has been noted that the highest rate of damage occurs in higher resistivity soils when viewed from the standpoint of soil. This is, of course, as would be expected since a pipe line is generally the best ground rod in an area.

Another factor in lightning damage



Radio aerial gas arrestor fused by lightning or surge.



An undamaged radio resistor and one completely evaporated by surge or lightning.

is that certain areas are more subject to it than others. In one case this has been correlated with power company damage, both the rectifier and the power line being the ones most often damaged in the respective companies.

Equipment damage generally takes four forms. Rectifiers stacks often look as if they have been shot at with buckshot. In such cases no serious damage seems to occur. Sometimes D. C. meters, particularly ammeters, are almost exploded. Often burned spots are observed on the rectifier case door where metal switch handles or connector screws are close. Once in a while stacks are burned between the mounting bolt and the stack. This is particularly bad because a casual inspection does not reveal the damage which can connect the case, which is normally insulated from the D. C. side, to D. C. sometimes causing very adverse effects on power line grounds. These grounds are not generally checked for corrosion regularly so that such trouble can be serious. (The author believes that pipe to soil voltages, better called ground rod to soil voltages, should be checked even more regularly than pipe line pipe to soil voltages near a rectifier). Next in importance in equipment damage by lightning is flange insulation (or similar insulation) damage. This occurs all too often. Third, fires in buildings around insulated flanges have been blamed on lightning. Last is bond wire damage. Any resistance bond between lines or between rectifier and power line ground should be checked at least once a month. They are extremely difficult to keep intact. Small radio resistors should never be used in any pipe line circuit unless for intermittent service as in meters.

The fact that insulating flanges are damaged and also the fact that these flanges are seldom right at a rectifier has caused the author to conclude that not all lightning comes from power lines and certainly not too much of it comes from anything resembling direct strokes. The best explanation would seem to be induction from strokes. While a flash of lightning between two clouds and a pipe line does not resemble an electrical transformer, the elements of a rather special transformer exist.

**Power Line Surges.** It is well established that certain power line faults cause serious amounts of current to flow in nearby wires by transformer action. The same seems true of pipe lines paralleling long power lines. In fact one case has been fairly well established. Because such faults are infrequent and irregular they can hardly be separated from lightning when viewing damage caused, unless a particular fault is of record and this fact is dug out and tied in with the damage time-wise.

**About the Author**

JAMES R. COWLES graduated from Oklahoma University in 1936 with a B.S. in engineering physics and from the Massachusetts Institute of Technology with an M.S. degree in 1937. He worked in the engineering department of the Oklahoma Natural Gas Company from 1939 to 1954, inaugurating and heading cathodic protection work the last years of employment. He is now a consultant on cathodic protection and a manufacturer of cathodic protection instruments.

**Arrestors or Protectors.** The simplest lightning arrestor is a gap such as found in a spark plug. In fact in the early days of radio the use of spark plugs as arrestors for outdoor antennas appeared almost regularly in the popular radio magazines. A spark will not jump a gap, no matter how narrow, in air at atmospheric pressure, until about 300 volts occurs, then if current is available to keep the spark fed it becomes an arc which will pass current at a lower voltage (electric welding is done with about 30 volts).

Thus a gap has two faults, it will not relieve low voltages, and if there is current to sustain an arc, it will burn the points and perhaps melt them together. In spite of first opinions, the fact that about 300 volts are needed to jump a gap this does not seem too serious since the gap can be narrower than the insulation being protected. Also, transformer insulation, in rectifiers can stand perhaps 4500 volts momentarily. Certainly selenium stacks stand up remarkably well with no protection. The limit on gap separation is that which is practical without danger of moisture, dust or corrosion products closing the gap. Often two plates separated by sheet mica with holes in it are used. Burning of the points is serious, of course, as it may cause the arrestor to short. One attack has been to use graphite points since these do not fuse, but pit.

Another approach is to add what is known as a valve material in series with the arrestor in pipe line work as in power line work. The most popular valve material seems to be a special silicon carbide (a different grade of which is used for grindstones). The peculiarity of this material is easily illustrated by considering a resistor made of it such that one volt will cause 0.001 ampere to flow through it. If two volts are applied about 0.01 ampere will flow. Four volts will cause about 0.1 ampere to flow, etc. Thus at high voltages it will pass a large current but it will drastically reduce currents due to low voltages. This material is thus the opposite of a gap in behavior and when the proper resistor made of it is placed in series with a gap the combination affords a good protector whose points are not too subject to burning. There are, of course, other methods of accomplishing the same results, but with the exception of the use of lead oxide pellets, are not too common.

Some work has been done with valve material less the spark gap. Six-inch by $\frac{3}{8}$-inch discs of valve material are apparently satisfactory across flanges and one large manufacturer is offering such assemblies in a suitable case for outdoor mounting.

A different arrestor arrangement which the serious researcher will discover is the neon tube type of arrestor Special bulbs of this kind are made for telephone work. The object is a gap which will relieve at less than 300 volts (the lowest direct current voltage for which a neon tube can be built being in the neighborhood of 80 volts). These arrestors have been used around rectifiers but their tendency to explode seems worse than with other types and so their use has not been extensive.

A recent proposal is to use two anodes buried close to each other in the same backfill, but not touching, have been proposed as arrestors. This

system would appear to have merit, particularly where the anodes could be used to obtain cathodic protection current (which is not possible in all soil) since the cost would be higher than for some other arrestors. Too, any arrestor is subject to explosion. A force which will tear a telephone pole up is not likely to go tamely through a small device the size of a match box without this danger. Fortunately, direct strokes are rare. The problem is control of the many lesser surges. The foregoing anode arrangement should minimize the explosion hazard. One disadvantage is that if a large unwanted voltage exists continuously across a flange it would seem unwise to give it such an easy bypass to force current through.

The problem with arrestors as the author views it is primarily one of adaptation, first with respect to the proper electrical arrangement and particularly with mechanical enclosures. A solution for the encasement of an arrestor for burial beside an underground insulating flange is no simple matter. On rectifiers the author currently uses 175 volt A.C. pellet arrestors on power line connections. These are three wire arrangements, the neutral being to rectifier case, and one wire to each side of a 220 volt service or one wire to rectifier ground if only 110 volt service is used. Low voltage gap-valve arrestors are used across D.C. leads and with 220 service between A.C. and D.C. grounds. Also to minimize damage by lightning D.C. meters should absolutely be out of the circuit when the meter switches are thrown, i.e., no S.P. switches should be permitted on meters, and external shunts should be used on ammeters.

**Power Line Neutrals.** Pipe lines may serve as bypasses for the currents flowing in power line neutrals (grounded wire). Such currents may enter or leave through the soil because of the geometrical relationship between pipe line and power line grounds, or by metallic connections as in gas distribution work where the neutral is grounded at each house. (Even though the neutral may be grounded to a water pipe this is generally a direct connection to the gas main since the two run to a water heater in the average home.

Also water pipes are usually cast iron with high resistance joints or Transite, whereas gas mains are steel with no joint resistance, therefore, the gas main is the main current carrier when current does flow). With proper wiring, particularly on the part of the electric utility the current flows in pipe lines are nominal in cities unless an open circuit in the neutral exists. Along R.E.A. construction and grounded "Y" transmission lines, the currents can be large however.

If metallic connections such as grounds can be eliminated by driven grounds, some relief may result. If the problem is current pick-up through the soil less chance of removing it exists, unless its flow can be broken up by insulating joints.

Generally alternating current has never successfully been tied in to corrosion though there are many operators who are sure there is some relationship. Further, a few cases occur from time to time where alternating current would be a convenient answer. Experiments with steel rods passing alternating currents through water will show that no noticeable metal loss occurs, but the rods will not stay polished either. There are no doubt some effect, but they seem to have little practical relationship to everyday corrosion control. One serious observation has been offered that when rather high A.C. voltages occur between a magnesium anode and soil, D.C. current output from the anode is lessened. A second observation by the same party is that certain telephone ringing currents can depolarize a cathodically protected line for a few moments. Actually cathodic protection is successful in the face of the many unwanted alternating currents known to exist so they apparently have more nuisance value than any other except in causing sparks when lines are cut or when meters are removed, when they are of course dangerous.

Lightning and power line surges are definite troubles which the corrosion engineer must face. Materials are available for beginning such work but much development remains. Currents from power lines are being observed and studied more than ever and their relationships are becoming clearer.

ACKNOWLEDGMENT

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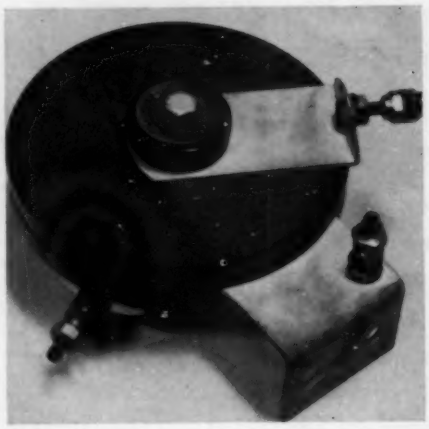
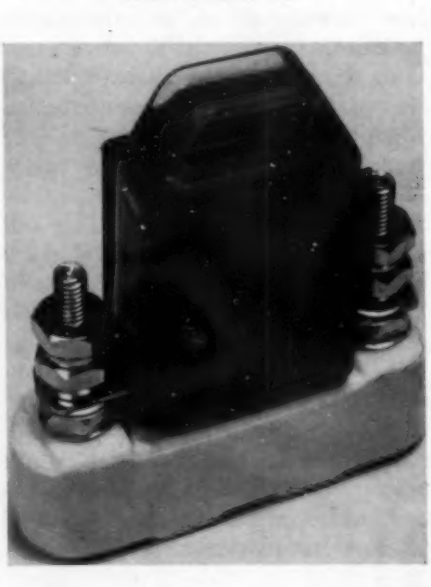


Twin disc lightning arrestor of valve material such as used across flanges.

Pellet lightning arrestor used for 220 volts A.C. and 110 volts A.C.



Railway signal lightning arrestor for 120 volts A.C. and less, 50 volts D.C. and less. Unit is standard mounting used in railway work.

# OIL LOSSES . . .

**They can mean the difference between profit and loss for a pipe line company.**

# How to Stop Them

**Here are the different types of losses and suggestions on how to isolate and minimize them.**

**By GEORGE G. HUGHES, Jr.**
Assistant Chief Engineer,
Interstate Oil Pipe Line Company, Shreveport

Oil losses in a pipe line company may be the difference between profit and loss. To effectively combat such losses it is necessary that they be isolated as much as possible to determine their relative magnitude, so that adequate measures to reduce or eliminate them may be adopted. A good reporting and recording system is a prerequisite in such a program.

### Types of Losses

**1. Measuring, Sampling and Testing Losses.** These losses may be traced to human error, and the use of inaccurate equipment and methods. The significance of such losses may be illustrated by the tabulation below on the custody transfer of a full 80,000-barrel tank of oil.

| Error | Amount | Barrels |
|---|---|---|
| Gaging | ¼" | 42 |
| BS&W | 0.10% | 80 |
| Temperature | 2° F | 80 |

It is especially important that such errors cancel out over a period of time and do not become cumulative. Inaccurate equipment and procedure would tend to give a cumulative error.

**2. Shrinkage Losses.** Shrinkage or volume reduction occurs when two different oils are mixed, since the mixture behavior of hydrocarbons does not follow the law of ideal liquids. Considerable data has been obtained which indicates that shrinkage increases with an increase in gravity difference of the components. For example, a butane and crude mixture would result in more shrinkage than a corresponding mixture of natural gasoline and crude. Because of the large increase in cycling plants, crude pipe lines have been accepting increasingly larger amounts of natural gasolines, butanes, etc., in recent years. This has caused many pipe lines to impose an additional allowance of from 1 to 7.5 percent of the volume of such light products.

Measuring, sampling, testing, and shrinkage losses may be classified as apparent losses from an industry standpoint, as distinguished from actual losses. Although apparent losses are a real loss to a pipe line company, they are not an actual loss to industry.

**3. Line Breaks and Leaks.** Losses from this source may be minimized by proper design, maintenance and operating procedures.

**4. Evaporation.** Evaporation is the escape of a liquid to the vapor state and results in a compound loss. In addition to the actual liquid volume lost, the remaining liquid suffers a reduction in gravity because the light ends vaporize first, and consequently the remaining oil is worth less per barrel. The rate of vaporization is largely dependent on three variables,

1. Vapor pressure
2. Temperature
3. Size of vapor space

The vapor pressure expresses the volatility of a liquid, the higher the vapor pressure the greater the tendency toward evaporation. The true vapor pressure denotes the actual vapor pressure of the liquid in equilibrium with its vapor space at a specified temperature, and is the primary cause of evaporation. The Reid vapor pressure is a convenient means of classifying the volatility of petroleum products at 100° F., and is determined according to ASTM Standard D323. The vapor pressure increases rapidly with an increase in temperature, consequently, there is every reason to try to reduce the oil temperature as much as possible. Reference to Figure 2 will show the relationship of Reid Vapor Pressure to True Vapor Pressure for crude oils. It is interesting to note that for crude oils the True Vapor Pressure is approximately equal to the Reid Vapor Pressure at a temperature of 70° F. and not 100° F., as with single component liquids.

The surface temperature of the liquid has been found to average about 10° F. higher than the atmospheric temperature. The beneficial effects of tank paints have been studied

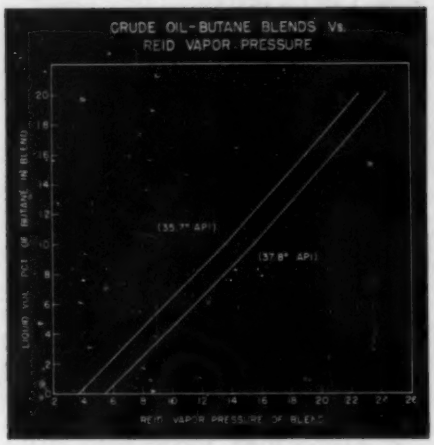



FIGURE 1

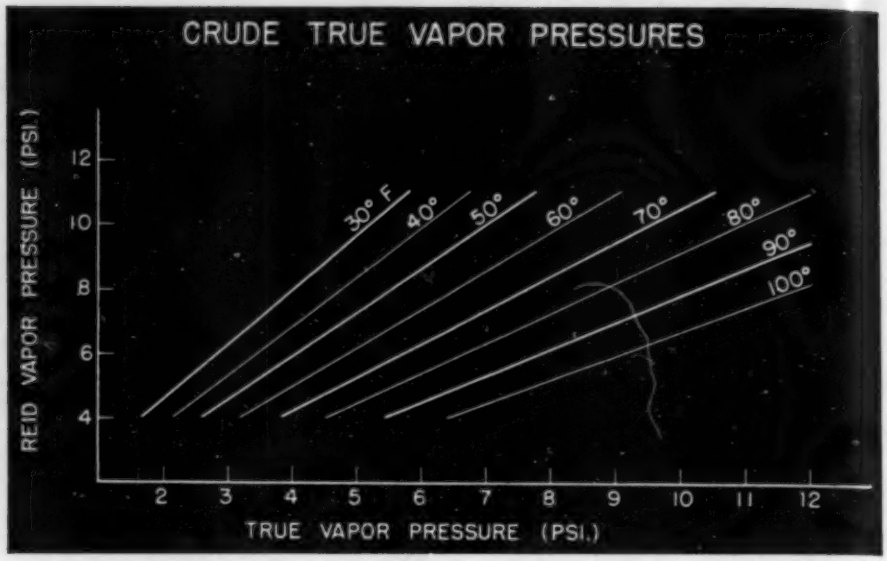



FIGURE 2

and the following adjustments for tank color have been proposed to be added to the 10° F.

| | |
|---|---|
| Aluminum | 0° F. |
| Chalking White | —5° F. |
| Gray | +5° F. |
| Black | +10° F. |

The size of the vapor space in a cone roof tank is dependent on the tank diameter and the level of the stock. This space contains the vapor and is the source of breathing and filling losses.

Breathing losses result from an expansion of the vapor volume due to temperature increase and due to a vapor pressure increase caused by temperature rise.

Filling losses occur when a tank is filled with oil, displacing vapors through the tank vent. These losses are proportional to the amount of vapor displaced and the concentration of this vapor. Stratification of the vapor in a cone roof tank exists due to the temperature variations in the vapor space and due to the differences in densities of the gases in the vapor space. Temperature variations of as much as 25° F. have been observed in the vapor space, and density of the gases varies from one half to three times the density of air. Con-

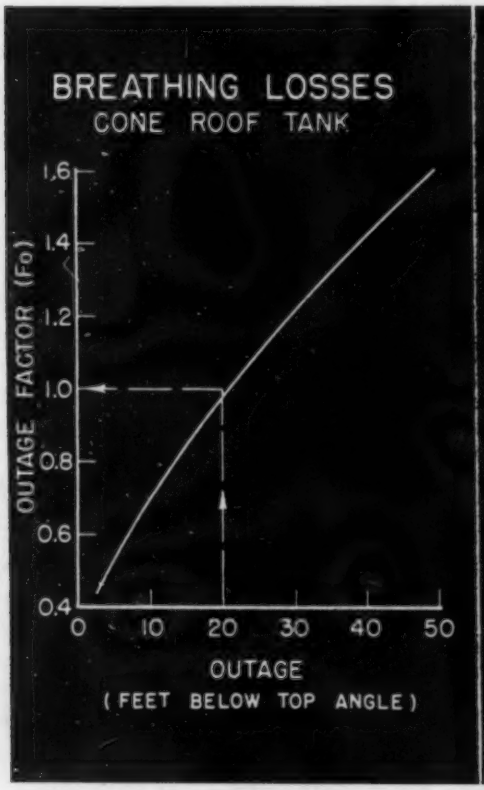



FIGURE 3

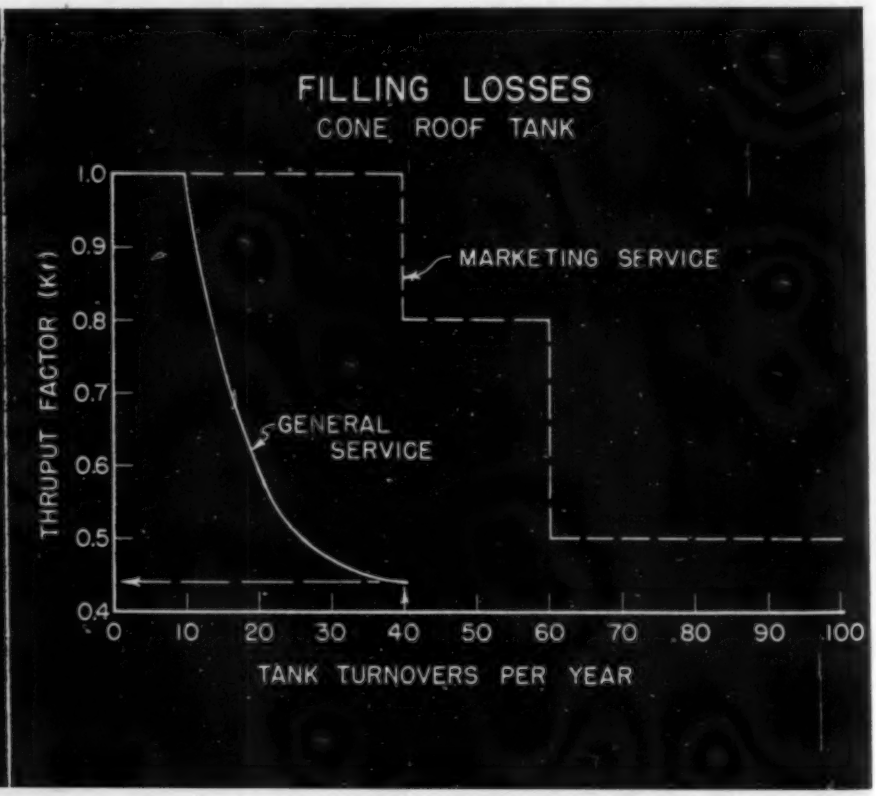



FIGURE 4

sequently, as fresh air is drawn into a tank, it will take appreciable time to become fully saturated with vapors. The layer adjacent to the oil surface will be saturated while the layer near the roof will be nearly pure air. Tests indicate that saturation of the vapor space may vary from 25 percent a day after a tank is pumped down to 90 percent three days after.

*Boiling losses* occur when the true vapor pressure of the oil exceeds atmospheric pressure, and these losses may be extremely high. When natural gasolines, butanes, etc., are blended with crude, the resulting vapor pressures may be very high. Where such mixtures are made, the concentration of light product should be controlled so as to prevent high vapor pressure mixtures from getting into tanks. Figure 1 shows the Reid vapor pressure of two typical crudes of varying blends of butane. It is readily apparent that even with crudes of low initial vapor pressure, butane additions in the range of 5 percent should be the maximum.

*Floating roof tanks.* There are many types of conservation tanks in use today, however, crude oil pipe lines are primarily concerned with floating roof tanks. The main advantages over cone roof tanks are reduced breathing and filling losses due to the elimination of vapor space. Further advantages are decreased fire hazard and reduced roof corrosion. Breathing losses occur between the roof seal and the tank shell. Filling losses are due to wetting of the shell and wicking action between the roof seal and the shell.

**TABLE 1**
**Tank Data**

| Nominal Capacity (Barrels) | Diameter (Feet) | Shell Height (Feet) | $(Diameter)^{1.8}$ |
|---|---|---|---|
| 5,000 | 30.0 | 40 | 456 |
| 10,000 | 42.5 | 40 | 827 |
| 20,000 | 60.0 | 40 | 1,584 |
| 55,000 | 100.0 | 40 | 3,981 |
| 80,000 | 120.0 | 40 | 5,527 |
| 125,000 | 150.0 | 40 | 8,260 |

**TABLE 2**
**Paint Factor**

| COLOR | $F_p$ |
|---|---|
| Aluminum | 1.00 |
| Chalking White | 0.75 |
| Light Gray | 1.10 |
| Black | 1.25 |

## About the Author

GEORGE G. HUGHES, JR., assistant chief engineer Interstate Oil Pipe Line Company, has been employed by subsidiaries of Standard Oil Company (New Jersey) since 1939. He was born in Alabama in 1916 and received a B.S. in electrical engineering from Rice Institute in 1938 and a M.S. in mechanical engineering from the University of Texas in 1949. During World War II he served as engineering officer in the Air Force. He was granted a one-year leave of absence from Interstate in 1952 to serve in the Supply and Transportation Division of Petroleum Administration for Defense in Washington, D. C. His assignments with Interstate have been in the Engineering and operating departments.

**TABLE 3**

| CONE ROOF | FLOATING ROOF |
|---|---|
| **Breathing Losses** | **Standing Losses** |
| $B = \frac{PD^{1.8}}{14.5} FoFp$ | $S = 0.49\ PD$ |
| B = Annual loss, barrels<br>P = True vapor pressure, psi<br>D = Tank diameter, feet<br>Fo = Outage factor<br>Fp = Paint factor | S = Annual loss, barrels<br>P = True vapor pressure, psi<br>D = Tank diameter, feet |
| **Filling Losses** | **Filling Losses** |
| $F = \frac{3\ PV}{10{,}000} Kf$ | $F^1 = \frac{V}{10{,}000}$ |
| F = Annual loss, Barrels<br>P = True vapor pressure, psi<br>V = Annual thruput, barrels<br>Kf = Thruput factor | $F^1$ = Annual loss, barrels<br>V = Annual thruput, barrels |
| **Sample Calculation Tank Data** | |
| Size and capacity—40′ x 120′<br>Average Reid vapor pressure—8 psi<br>Average temperature—70° F.<br>Annual Thruput—3,200,000 barrels<br>Average Outage—20′<br>Paint—Aluminum | 80,000 barrels |
| **CONE ROOF** | **FLOATING ROOF** |
| **Breathing** | **Standing** |
| $B = \frac{PD^{1.8}}{14.5} Fo\ Fp$ | $S = 0.49\ PD$ |
| P = 7.6 (Figure 2)<br>$D^{1.8}$ = 5527 (Table 1)<br>Fo = 1 (Figure 3)<br>Fp = 1 (Table 2) | P = 7.6 (Figure 2)<br>D = 120 (Data) |
| $B = \frac{(7.6)\ (5{,}527)\ (1)\ (1)}{14.5} = 2900$ | $S = (0.49)\ (7.6)\ (120) = 446$ |
| **Filling** | **Filling** |
| $F = \frac{3\ PV}{10{,}000} Kf$ | $F^1 = \frac{V}{10{,}000}$ |
| P = 7.6 (Figure 2)<br>V = 3,200,000 (Data)<br>Kf = 0.44 (Figure 4) | V = 3,200,000 (Data) |
| $F = \frac{(3)\ 7.6)\ (3{,}200{,}000)}{10{,}000} = 3200$ | $F^1 = \frac{3{,}200{,}000}{10{,}000} = 320$ |
| TOTAL LOSSES 2900 + 3200 = 6100 b/yr. | 446 + 320 = 766 b/yr. |

It is apparent that all types of evaporation and boiling losses can be eliminated by keeping the oil in pipe lines and out of tankage. Obviously this is not always possible in operations where batching and blending are required. The use of meters for making oil measurements instead of tank gaging is being accepted more widely in pipe line operations and aids in reducing evaporation losses.

**5. Other Losses.** Losses such as fire, theft, formation of basic sediment, etc., may be appreciable and an alert operating department should hold such losses to a minimum.

**Estimation of Losses.** It is readily seen, with the many variables present, that prediction of evaporation losses will be only an educated guess. The empirical formulae in Table 3 have been found satisfactory for estimation of breathing and filling losses.


ACKNOWLEDGMENTS

Material for this article was obtained from: (1) a paper delivered before the API, November 10, 1952, titled "Evaporation Loss of Petroleum From Storage Tanks"; (2) data made available by Interstate Oil Pipe Line Company.


—The End

FOUR A.M. LINE-UP at the breakfast counter of an Appomattox, Va., restaurant as pipeliners get set to start another day on looping a 73-mile 30-inch line of Transcontinental Gas Pipe Line from Texas to New York. The restaurant owner had been at work since 2 A.M. to have lunches packed.

# THEY LIKE PIPELINERS . . .

**This small historical city of 1200 population made room for 446 Williams Brothers pipeliners and their families. And . . . it wasn't just doors that opened to the church-going pipeliners.**

PIPELINERS have won the hearts of the people of Appomattox, Va., site of the historical meeting of Gen. Robert E. Lee and Gen. Ulysses S. Grant on April 9, 1865. And Appomattox, population 1200, won the hearts of the pipeliners with Williams Brothers Company.

When Transcontinental Gas Pipe Line Corporation's line was laid in 1950, Appomattox met pipeliners for the first time.

This year, when word got around that Transco was going to "loop" a 73-mile section of its line in Central Virginia with a new 30-inch pipe, Appomattox "wanted in." Within hours after the news came that a contract for the project had been awarded to Williams Brothers Company, Appomattox Mayor Chas. F. James was on the telephone calling Tulsa and asking that Appomattox be made headquarters for the spreads and promising that "whatever you want, we will get it."

What was needed was some place for the workers to live. Williams Brothers brought their own office on wheels, their own communications system, and equipment. But the problem for the little town was to find living quarters for a peak payroll of 446 workers, over half with their families. That added up to over 600 new people coming to town, and Mayor James set out to live up to his promise. He called upon town residents to make every spare room available and to remodel if necessary and let him list what they could offer. The word was passed and as the pipeliners began arriving in late April, they converged on the corner drug store where the mayor is a pharmacist, and he got them placed.

By the "kick-off date" of May 16, the pipeliners were adequately housed

**PIPE LINE REGULARS** came to town. Appomatox Mayor (right) Charles F. James welcomes pipe line veteran Tom Davis and his family and finds them a three-room apartment for their four-month stay in town. Left to right: Larry, 6; Mrs. Davis; Lynn, 1½; Thomas E. Davis, side-boom operator with Williams Brothers for 8 years; Dianne, 8, and Mayor James.

# IN APPOMATTOX, VIRGINIA

in the town and its surrounding rural area.

In case after case, Appomattox residents "moved over" and made spare bedrooms available, and arranged with pipe line families to "use our kitchen, too, and we will all be home folks together." That is the acid test in public relations, and the record is that Appomattox did the job. Local restaurants opened at 2 a.m. to pack lunches to be ready when the pipe line workers came in at 4 a.m. for breakfast. Stores opened at nights so that pipe line families could shop together. Banks arranged for cashing of payroll checks in after banking hours, and the motto of the town was: "Welcome and serve the pipeliners."

In tradition, Virginia is steeped in its cavalier dignity, conservative and cordially correct. Appomattox, in practice of hospitality, went the limit to be a good neighbor.

The first thing the pipeliners did when they arrived in town made a big hit with the local people and the last thing they did before they left wrapped it up as a perfect performance as good neighbors. For that part of the story we must take a look-see at Williams Brothers Company and their "regulars."

T. E. (Tom) Davis was Williams Brothers boss on the Appomattox project. He had joined the firm in 1929 as a foreman and has handled some of the toughest pipe line jobs in the country. His record in the front office is that he gets a tough job done smoothly as simple routine.

Davis had been in Appomattox but a few hours when he looked up the pastor of the Baptist Church, Dr. Carl A. Collins, Jr. the "regulars" with his spread are church-going pipeliners, and Davis knew it. Col-

**THE PREACHER SAYS 'THANK YOU.' Dr. Carl A. Collins (right), puts firmness into that grip as he thanks pipe line superintendent T. E. Davis for giving a modern parking lot job to his church.**

lins, State Chaplain of the American Legion, showed the superintendent the church's new $70,000 educational building and said he would be happy to have the town's guests come to his church, but "where we will park the cars I do not know." Davis asked if a lot was available, and the preacher said the church owned a lot next door, but having scraped the bottom of the money barrel, "it will be years before we can get up those big trees and grade that lot." Right off, Davis asked, "When do you want it done? We would like to help your church and we have a couple of days before we start laying pipe!"

By eleven o'clock the next morning, the big black oaks had been leveled, the stumps pulled, and within another 24-hours, the lot had been graded and crushed rock rolled in and the church had, for free, a modern parking lot for 50 cars.

That's when the town really sat up and took notice that these "pipeliners are good neighbors."

But this first performance merely set the pattern of what was to follow. Dr. Collins said his Sunday school enrollment jumped over 100, and other denominations put out the welcome mat. The worker's wives attended to church nurseries. Dr. Collins filled with emotion as he recalled such incidents as Martha Ray Boyles, a pipeliner's daughter, singing in his church choir and the superintendent's daughter, Karen Davis, attending a church camp and leading the young people of his congregation. "It will be a sad day for our church when these wonderful people leave. We will never forget them."

The summer of 1955 will linger in the memory of Appomattox. The Ranger—Historians at the National Park Service noted a sudden upswing in attendance at such buildings as the McLean House where Lee and Grant made one nation out of warring America in 1865.

County Sheriff, David T. Robertson, said, "This is the finest group we ever had in our town. I have had no law-enforcement problem."

Department store owner C. S. Jenkins said, "Our town has had wonderful business this summer and it was the pipeliners who made it possible. And they were the finest people to serve we ever had."

Restaurant owner Jesse Guill said that he and his wife were going to set out next month to travel to Idabel, Okla., to see the country where the pipeliners came from. Guill is entitled to such a trip, for he is one who was on duty at 3 a.m. daily to see that the guests thought well of Virginia cooking. Chances are other Appomattox people will want to travel out to have a look at the "oil country." The greatest ambassador Oklahoma ever had was Will Rogers, but now maybe Williams Brothers Company can take over, for wherever their pipe line crews go, they leave good will for the "Sooners."

When the 73-mile Transco project neared its end and the "regulars" began pulling out to trek back home to await call to the next job, General Superintendent Davis published an open letter to the people of Appomattox in the Appomattox county newspaper. He thanked the people of Virginia for their hospitality, and declared, "We have been in big towns and small towns, but yours is one of the most neighborly we have ever seen." Paul E. Mackie, office manager for Williams Brothers added, "We could not have asked for anything more in the way of local cooperation." Mackie, a native of Maine, grinned and said they had almost made a Confederate out of him down south in Virginia.

Maybe it can be summed up in the words of the wife of one of the pipeliners. She said simply, "We like the people here." An Appomattox family had made extra rooms available, so she could have an apartment, and keep her family together while her husband was building up a career as a pipeliner.

The Pulitzer prize-winning historian, the late Dr. Douglas Southall Freeman, called the peace made at Appomattox, Va., April 9, 1865, a "reconciliation of gentlemen with gentlemen." That concept of the dignity of man, and that a handclasp in friendship is worth more than devastation from not being able to "get along," has now been borne out by the 1955 experience when the same peace making town of 1200 moved over and made room for the pipeliners and found that "pipeliners are good neighbors." —**The End**

How one small pipe line company effected quick savings by . . .

# STREAMLINING

# to cut labor costs and crude losses

**By H. D. CHRISLIP,**
Superintendent of Pipe Line,
Deep Rock Oil Corporation, Tulsa

STREAMLINING a pipe line system is one way of enabling a refiner to economically continue to gather the stripper crude in his "own back yard." This was the course that Deep Rock Oil Corporation elected to pursue early in 1952 as a means of cutting operational costs. Revamping the main line facilities and revising and re-equipping some of the gathering facilities during the past two years has resulted in lower direct operating costs of delivering 15,000 barrels per day of crude to the Deep Rock plant, and has substantially reduced crude losses. The results of this work are conclusive proof that modernization with an eye towards operating savings offer an excellent opportunity for capital rewards.

Deep Rock operates a gathering and transportation system which supplies the Cushing refinery with crude. This system has been extended into nearly all of the major fields in eastern Oklahoma. Most of the system was constructed prior to 1930, but some of the lines in the old Cushing field were built in 1913. The line gathers and transports about 15,000 barrels per day of crude from 1054 lease connections, and delivers an additional 2000 to 5000 barrels per day to the plant from other companies at interchange points.

In 1952 a study of operations was

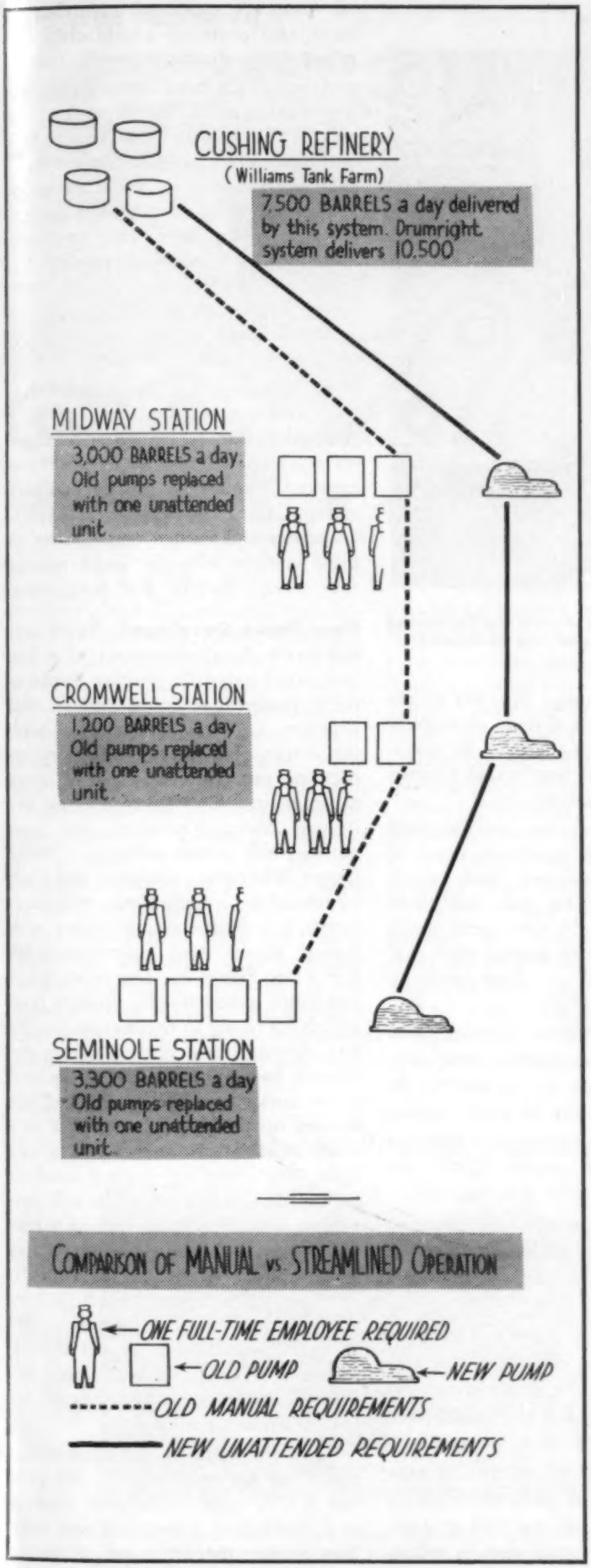

CUSHING REFINERY
(Williams Tank Farm)
7,500 BARRELS a day delivered by this system. Drumright system delivers 10,500
MIDWAY STATION
3,000 BARRELS a day. Old pumps replaced with one unattended unit.
CROMWELL STATION
1,200 BARRELS a day Old pumps replaced with one unattended unit.
SEMINOLE STATION
3,300 BARRELS a day Old pumps replaced with one unattended unit.
COMPARISON OF MANUAL vs. STREAMLINED OPERATION
ONE FULL-TIME EMPLOYEE REQUIRED
OLD PUMP
NEW PUMP
OLD MANUAL REQUIREMENTS
NEW UNATTENDED REQUIREMENTS

FIGURE 1—Before and after: Seminole-Cushing system.

## New pump developed . . .

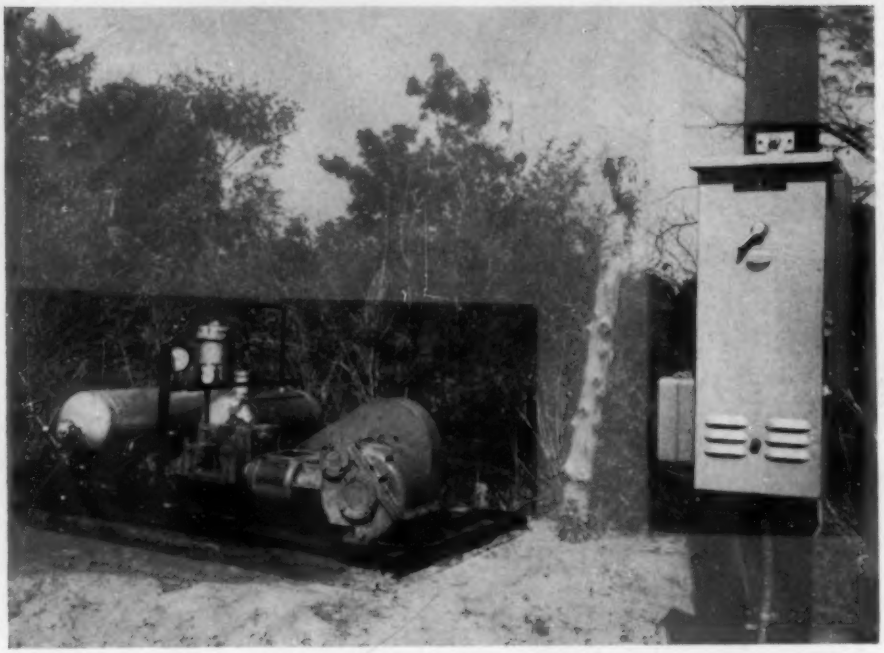


FIGURE 2—This unit, installed March, 1954, has pumped 50,000 barrels of crude and has required no maintenance yet. It handles 116 barrels per day of oil gathered from six leases.

begun to determine how to make the system more efficient and capable of competing with an increasing supply of cheaper crude. The operation had the following advantages:

**1.** The crude being bought at the time was "sweet" and of a high quality. Some of these crudes were suitable for lube manufacture and other speciality uses.

**2.** It was a short distance from the source of crude to the refinery.

**3.** Deep Rock is well-known in its operating area and enjoys a good customer relationship.

**4.** Continued drilling activity was anticipated because of a good crude price, and the advent of new completion practices had made the shallower areas more attractive than they had been.

**5.** A few of the stripper leases would some day be valuable to the crude supply because of water-flooding.

On the other hand, here are a few of the disadvantages that had to be overcome to improve operations:

**1.** Gathering segments were complex because of continued additions over a period of several years. For example, one of the main gathering systems required 65 field pumping units to deliver the gathered crude to the station. This required scheduling most of these pumps in order to get crude in, and even then excessively high line pressures had to be maintained. Resultant line breaks created a serious loss situation.

**2.** Most new drilling was on small leases and erratic in nature; many of which were equipped with small tanks and required individual field pumping units. So even new leases contributed to high gaging costs and we had no low cost flush areas to offset these high costs.

**3.** On our Seminole-Cushing main line system three manual relay stations were operated, measuring in and out of tankage at each station. This resulted in excessive manpower requirement and sizable filling and evaporation losses at these points.

**4.** Most lease connections were in the stripper class, and many of them had no future potential from waterflood.

Analysis of the problem indicated that some of the disadvantages outlined could be overcome without too much cost and that the solution of these would in no way have an adverse effect upon our previously outlined advantage. **A study of operating costs indicated that our two greatest areas for improvement were in reducing operating labor costs and crude oil losses.** A satisfactory solution of these two problems would eliminate most of the disadvantages.

After establishing these two main problem areas as objectives, the approach to a solution was begun. This was to be to attain maximum advantage of the use of electrical energy to reduce operating costs on the gathering and main lines, and to revise methods for handling crude that would reduce the number of times crude was handled from the time it was purchased in the lease tankage until it entered the refinery.

To re-equip existing facilities was too expensive, but improvements were possible in the type equipment used on new connections. Many new connections were on old existing complex systems. Great difficulty was experienced in delivering crude through these systems with the small rotary-type pumps that we had been using.

**New Pump Developed.** Work was begun on the development of a low cost, small capacity, positive displacement pump that could correct this problem. This was accomplished with the design of a small compact reciprocating pump unit capable of operating against high pressures and delivering about 30 barrels per hour with a small electric motor as a prime mover. The pump, designed and built by one of the leading pump manufacturers, is a double acting duplex with 3-inch stroke and interchangeable liners (see Figure 2). The pump starts and stops automatically from a float switch operating in the suction header and automatically vents air from the ground lines by a float device located in the suction header. A smaller tank located on the pump frame acts as a sump tank in the event of leakage from the venting valve and is equipped with a float which will prevent it running over in case of a leak from the vent system. At the end of each cycle of operation the sump is emptied by the pump as it is connected directly into the suction header through a small check valve. Modification of this type unit has been developed for use on rotary pumps for low pressure operations.

The development of dependable power in most rural areas by the various R.E.A.'s has made this type of equipment most desirable. These units thus become more economical over a greater period of time in the life of a

**This was replaced . . .**

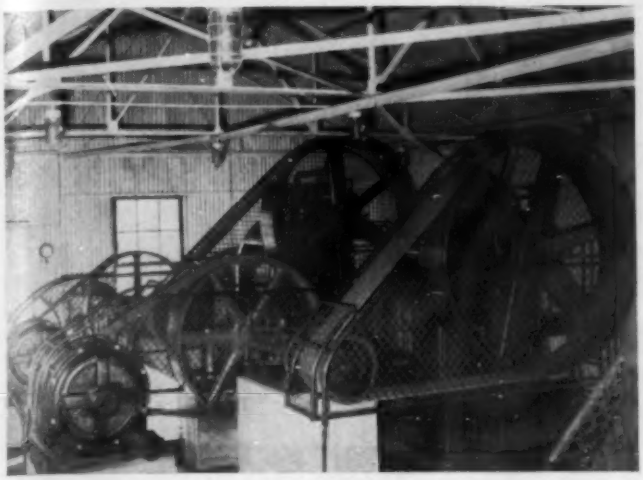


FIGURE 3

**Original station equipment, shown in Figure 3, was replaced by the typical new station installation shown in Figure 4. Large box on the control panel houses the starter assembly; smaller box on left contains**

**. . . by this**

FIGURE 4

**the coding equipment for telephone monitoring. The smaller controls house the clock assembly and high and low-pressure shutoffs for manual operation.**

property than conventional installations. They operate with a minimum amount of gager attendance. This enables our gagers to devote a maximum amount of time to the job of purchasing oil. They have permitted Deep Rock to continuously serve areas during bad weather when conventional equipment would be out of service because of being inaccessible to the gager. These units also required a minimum of attention from maintenance personnel.

Operations with these type units proved so successful that in many cases the company was able to revamp existing facilities where steam sales were being paid to operators. The savings from this and improved operations justified new installations. By interspersing completely automatic type units with time delayed starting units operating from clocks, scheduling was improved to the extent that on one main gathering line, peak operating pressure was reduced by as much as 200 pounds.

The big problem on one main line operation was to reduce the number of times crude was handled through station tankage.

The first step was to devise a method of measuring oil received from the field that would enable the gagers to have proper inventory control for over and short without measuring in and out of station tankage. This was accomplished by the installation of positive displacement crude oil meters at each station. At one station, two of these meters provided gagers with satisfactory over and short information. At another station, one meter did the job and a remote counting device enabled the gager to record his inventory each day and eliminated the necessity of making trips to the station for over and short checks. Two additional meters solved the problem at a third station.

The next step was to devise a method making it possible to pump from each receiving station direct to the refinery tank farm (see Figure 1 for schematic of before-and-after diagram of Seminole-Cushing system). About 7500 barrels per day of crude

**Crude is metered through positive displacement meter banks . . .**

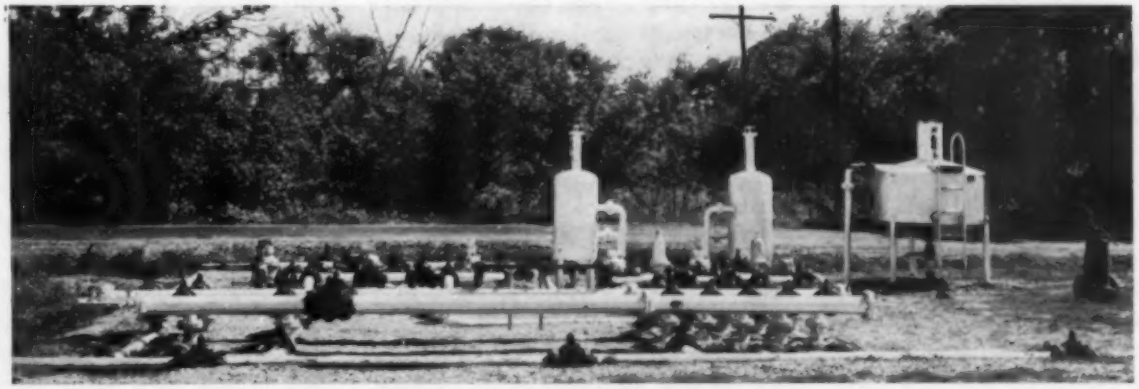


**FIGURE 5—Tank manifold area. Prover tank at right is tied in to manifold for convenient proving of twin meter banks. Meter bank on the right, with the small surge tank, provides venting equipment for removing air on metered field lines. Meter bank on the left serves trunk lines entering plant. Venting equipment shown on the field line meter bank is typical of meter connections at all field stations.**

**"A change in the delivery rate of as much as 6 barrels per hour will cause a readable shift on the area traversed by the pen . . ."**

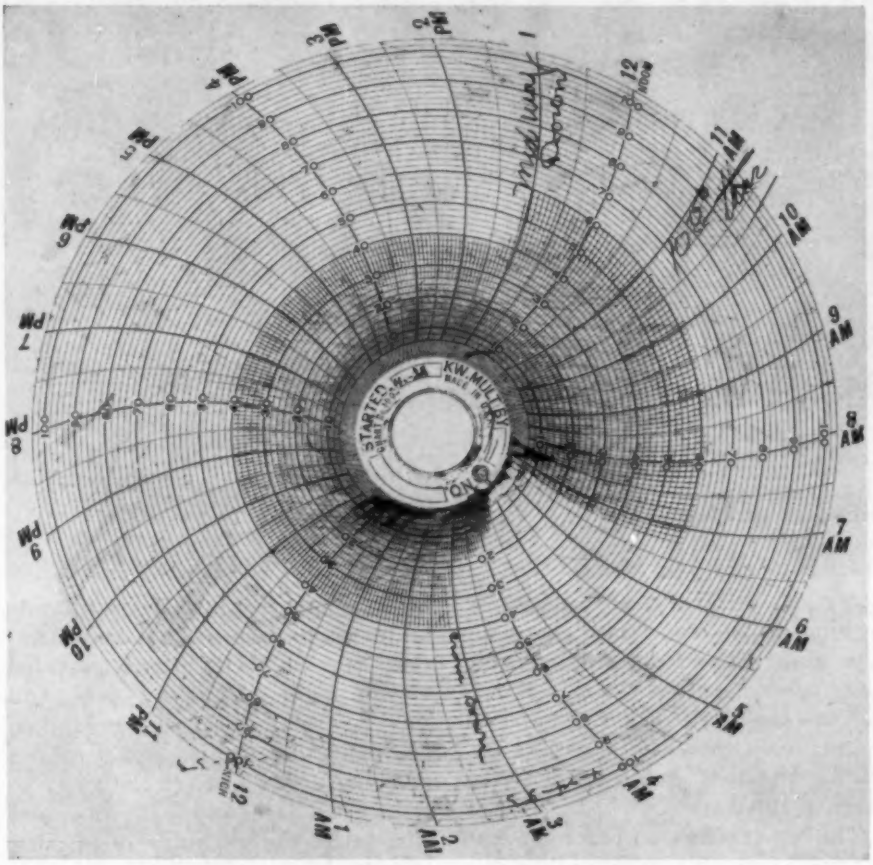


FIGURE 6—Chart was put on at 6:56 and indicates a delivery rate from Midway and Cromwell of 360 barrels per hour until 1 P.M. At this time the batch from Cromwell has reached Bristow. Bristow was shut down and Cromwell continued at 240 bph until the movement from Cromwell was completed at about 3 A.M. The graduation area between 3 and 5 A.M. indicates line drain into the plant.

## Mounting arrangement

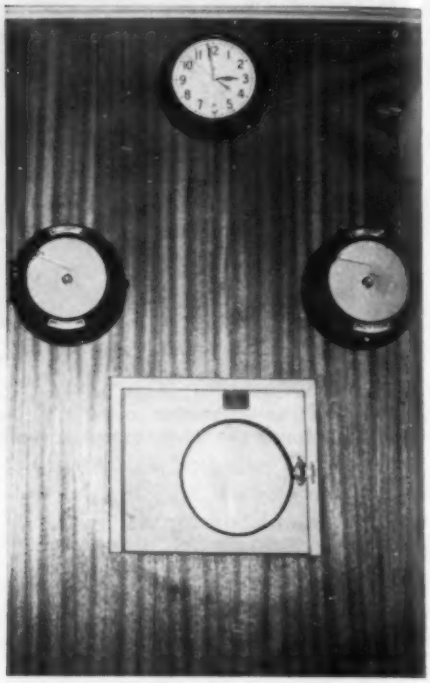


FIGURE 7—Mounting assembly in the tank farm office. Lower instrument is recording gravitometer used for establishing batch interfaces.

would be handled through the system; approximately 1400 of which would have to be accumulated and batched from Cromwell. The remainder would be injected at Seminole and at Bristow. The main bottleneck was in the Seminole-Cromwell system which consisted of about 8 miles of double 4-inch, and 10 miles of single 4-inch. If this situation could be relieved, the job could be done rather easily; if not, the approach to automatic operation would have to be altered by some means of relay at either Bristow or Cromwell. A study of the Seminole area revealed a number of crude lines running in the general area between Seminole and Cromwell; many of them unnecessary or too large for the amount of crude now being produced at Seminole. Since the 4-inch line was a practical size for salvaging, it was felt someone else having a larger system in the area might be interested in releasing their line to Deep Rock and salvaging the 4-inch system. This proved to be the case and a 6-inch system was acquired between Seminole and Cromwell.

Then the re-equipping job began. Old outside bearing pumps which required continuous manual attention (see Figure 3) were replaced. A conventional 2½" to 5" by 10" duplex reciprocating pump equipped with an electric motor (see Figure 4) was installed at each of the three stations. At Seminole, two 80,000 barrel tanks were located away from the station in which deliveries were received from other companies. This crude must also be moved to Cushing. Here a small transfer pump was installed, equipped with an electric suction valve on the line from 80,000-barrel storage tanks. This valve and pump starter were actuated by a level device located in the station tankage which provided for an automatic transfer from the 80,000-barrel tanks to the main line pump when station tankage was reduced to a predetermined level.

At Cromwell, since it was no longer necessary to transfer at this point, speciality crude was accumulated for a weeks' time, Seminole and Bristow stations were then locked out and speciality crude transferred once each week. At Bristow a similar type injection system was used which fed into the line continuously, except when batches were moving through the line. To provide additional flexibility for scheduling, a speed increaser was installed on this pumping unit providing four injection rates at this point.

To properly coordinate these crude movements, all controls for starting and stopping were remoted to the tank farm at Cushing over the company telephone system. The control on the station pumps is by a telephone coding device which enables

the tank farm receiving gager to dial in to any pump station on the system and determine if the pump is operating. An audio arrangement on each pump enables the receiving gager to hear the operation of the pump.

If the pump is not operating, a chime device in the selector coding equipment of the station tells him whether or not the power is on. If power is available, he may dial an additional code and cause the pump to start. Another code enables him to stop the pump. Field gagers keep the chief clerk posted as to receipts at each station and movements are coordinated by him through our receiving gagers at the refinery tank farm. Controls are available for operation of these units by the field gager when necessary. Provided on each unit are float controls or clocks for starting and stopping, and high and low pressure shut-down devices.

There has been some deviation from the completely automatic approach to a semi-automatic control of the main line system. This was done to relieve a portion of responsibility from the field gagers to enable them to spend more of their time in purchasing oil, and to better control movements by having them more closely integrated to refinery requirements. Further reasoning for developing this type control was that the pattern of operations at the tank farm required having personnel continuously on duty. Since this personnel could be used at no additional cost and at a reduction of investment in controls, it appeared a satisfactory solution to the main line pumping operations.

In conjunction with utilization of tank farm personnel, a unique control system was developed for early warning in case of line breaks which would enable the receiving gager to promptly shut down pumping equipment and take action to get repairs made. The line break detector consisted of a conventional electric demand meter located in the tank farm office which recorded rate of flow into the tank farm. All of the crude delivered into the refinery tank farm is metered through positive displacement meter banks (see Figure 5 for tank farm manifold).

Each of the main line meters is equipped with a transmitting device that directs an impulse for each one half barrel of crude that is delivered through the meter into the demand meter. Here it is recorded on a wax chart by a pen arm operating on a 5-minute cycle. As long as flow is steady, the pen arm on each five minute cycle will traverse exactly the same area, the periphery of the traverse, thus drawing a perfect circle around the chart. The maximum reading on the chart when multiplied by a factor will give readings in barrels per hour. A change in the delivery rate of as much as 6 barrels per hour will cause a readable shift on the area traversed by the pen (Figure 6 illustrates a typical chart; Figure 7 shows mounting arrangement in tank farm office).

Crude gathered in the Cushing-Drumright area presented no particular main line transportation problem as much as this crude was delivered by field pumps directly to the tank farm through meters at the manifold shown in Figure 5, or relayed by two 2½-inch to 5-inch by 10-inch duplex reciprocating pumps equipped with electric motors which operated automatically from tanks floated on the line at the two stations in the Drumright area. One of these stations has been in automatic-type operation for 26 years. This previous operating history provided an excellent experience history for determining the number of controls necessary for our Seminole-Cushing installation. Inventory control in this area was improved by the installation of positive displacement meters in front of each station.

In 1955, with the trial runs over, Deep Rock is able to realize further savings on maintenance, and a reduction in supervisory requirements. These factors are sometimes overlooked. The company is realizing a total saving of almost twice the objective.

Some key considerations in measuring the over-all results of the program indicate that two of the most important decisions were in regard to the use of positive displacement meters for measurement purposes, and a simple approach to solving the main line problem which required only a minimum in controls. The improved inventory control for district gagers, providing them with a better method of measuring the results of their work in regard to shortage, has provided a substantial additional dollar saving in crude oil losses. The simple design of our control program has provided no difficult maintenance problem, and the utilization of more prefabricated equipment has materially reduced installation costs.

The successful use of crude oil meters for control purposes has pointed the way toward consideration of these units for custody transfer. Currently in the planning stage is the utilization of meters to eliminate one more step between the well head and the refinery still. Plans call for equipping with mixers two 55,000-barrel storage tanks to float on the line to the refinery stills. One to carry our lube stream, and the other the mixed stream. The batched crude coming in from Cromwell will be segregated at this point and delivered into conventional tankage, but still sold by meter. When this last phase of work is completed, further savings are expected in crude oil losses because of improved handling on the tank farm. The plan is to schedule about 80 percent of the plant throughput through these tanks. It is anticipated that the savings on tank cleaning by mixing this amount of crude will quickly pay out the cost of the entire remaining program.—**The End**

## About the Author

H. D. CHRISLIP is primarily responsible for the method of streamlining a small pipe line system described in this article. He is now superintendent of pipe line for Deep Rock Oil Corporation in Tulsa.

Internal coat of epoxy resin made pipe easy to test and clean. The saving in gas (used to clean line) was increased greatly.

# Big Pipe With Slick Inside Pays Off

**Internal coating greatly reduced Transco's cleaning and drying problems after hydrostatic testing 36-inch line laid by ordinary methods.**

See March, May and June (1955) issues of PIPE LINE INDUSTRY for additional articles on this project.

**By DONALD M. TAYLOR,** Editor, PIPE LINE INDUSTRY

IT IS HARD to spend anything like the sum of $83 million without learning a few new facts. This was certainly true on Transcontinental Gas Pipe Line Corporation's new expansion program which was designed to raise the company's system capacity from 565 million cubic feet per day to 695 Mmcf. The program included 315 miles of 36-inch pipe, 219 miles of 30-inch, and 10 miles of 24-inch.

Two outstanding facts emerged from the program.

- The heavy .406 wall 36-inch pipe can be laid as efficiently as 30-inch by conventional methods.
- Internal coating greatly reduces the cleaning and drying problem after hydrostatic testing.

Some of the innovations incorporated in the construction and design of the line are shown here in pictures.

Small tractor "crumbs" 51-inch-wide ditch on Houston Contracting Company spread in northeastern Alabama. The small bulldozer was used principally to smooth bottom of ditch after blasting. Minimum depth of ditch was 5 feet, 6 inches for the 36-inch pipe. Most of the ditch on Houston spread was cut by three machines: first a tractor-mounted plow or ripper, a medium-sized ditching machine, and finally the large, specially-modified ditching machine with tracks spread to straddle the wide ditch.

There was no lowering-in on the Williams Brothers spread in Virginia. The 30-inch pipe was laid directly in the ditch after leaving the cleaning, coating, and wrapping machines. This eliminated several tractors and the usual skid trucks.

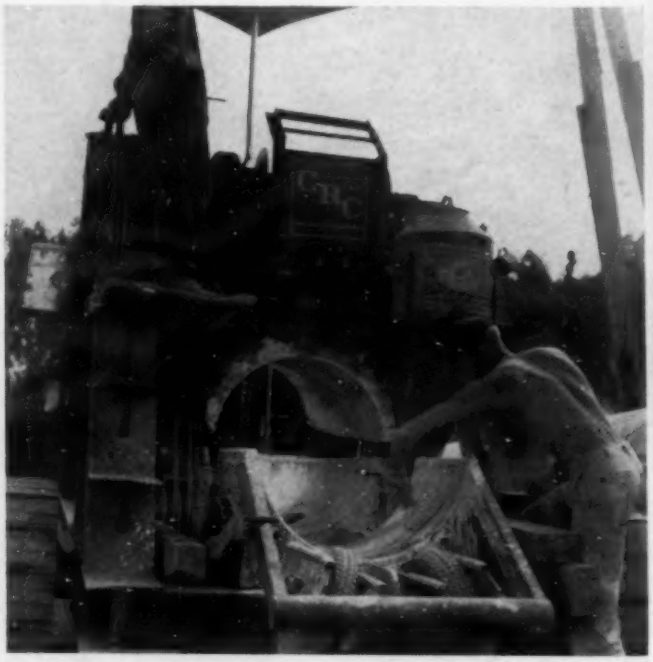
## Laying Techniques Varied With Contractors, Terrain

CONTRACTORS ARE perhaps the most adaptable people on earth. Especially pipe line contractors, whose chief assets are construction money, equipment, a bag of tricks, and an ability to improvise when weather and terrain are unfavorable.

As shown here, one contractor welded up the sections of line before starting ditching and lowering-in operations. Another lowered the line into the ditch as it came from the coating and wrapping machine. It would be impossible to list all the variations in laying techniques which made each one of the contractors on this job successful.

One thing which contributed heavily to the success was the experienced inspectors with Transcontinental Gas Pipe Line Corporation.

This bending machine on the O. R. Burden spread in Louisiana deforms pipe which had been previously yard-coated. Because ditches would not stand up in heavy rains, Burden completed sections of the line before starting ditching. During brief dry spells, ditching, lowering-in, and backfill gangs worked closely.



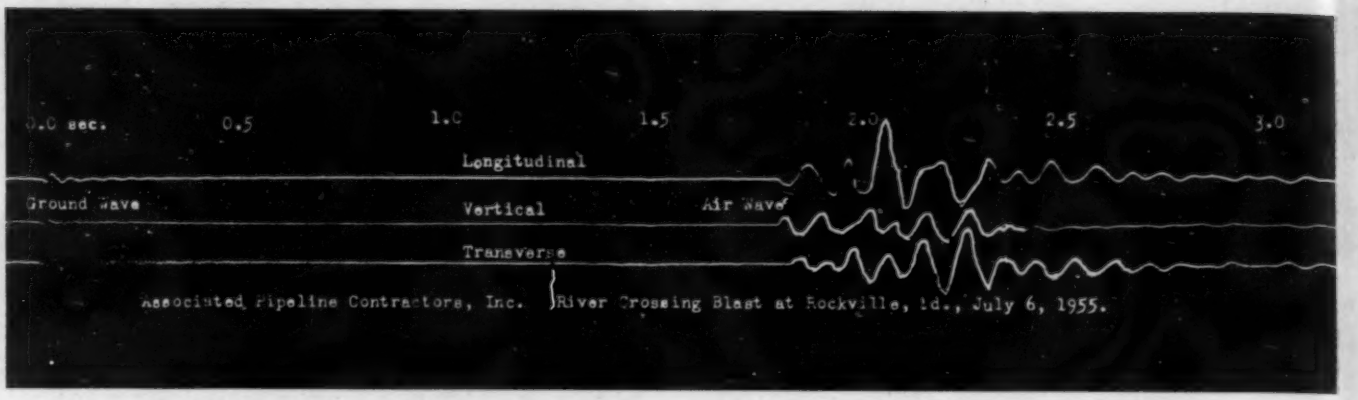
Painting the shoes on the bending machine on the Associated Pipe Line Contractors' spread in Maryland minimized damage to the asphalt coating which had been previously applied in pipe yard. After each joint was bent, pipe was jeeped and any damage done by bending machine was repaired.

I. W. (Spider) Dods (left), Transco's construction superintendent on the 83 million-dollar project holds a field conference in North Carolina. Center is Panama Shiflett of Panama-Williams Company; right is Transco inspector A. L. Barnett. Standing is L. M. Kingsland, Transco engineer.

New 24-inch rolls of kraft paper speeded up work on the coating and wrapping machine on the Western Pipe Line Contractor spread in Georgia. While the rolls weighed about 180 pounds each, they eliminated frequent stops. Two rolls per machine were enough for 1500-1800 feet of 36-inch pipe.

Super-inch pipe is lowered into the ditch by roller-type cradle on Midwestern Constructors' spread in Alabama.

Electrically-operated line-up clamps were used by several spreads. External line-up clamps were used in several instances in addition to internal ones.




**Blast record taken in house 1800 feet from explosion proves there could be no structural damage at this distance.**

# Seismograph Records Potomac Blast

THE BEST WAY to win a lawsuit is to prevent it. This is why Associated Pipe Line Contractors, Inc., wanted the record shown above which conclusively proves that no damage could have resulted to a dwelling 1800 feet from a Potomac River crossing blast.

Transco's crossing is about 20 miles above Washington, D. C. within earshot (so far as a blast is concerned) of many wealthy estates. And chances were excellent that nearby homeowners would give their houses a thorough going over for damage after they heard the blast. Some lawsuits were a possible result.

But the little piece of film pictured above would make the liklihood of winning such a suit scant to say the least. It shows the direction, amplitude and frequency of the aerial and ground vibration resulting from the blast. Extensive research by the U. S. Bureau of Mines, insurance companies, and seismological engineers has produced criteria which define the amounts and types of vibrations required to damage structures.

For instance, at 10 cycles per second a movement of .04 inches is required to produce damage. At 25 cycles the movement must be at least .02 inches.

But the traces on the film show a wide safety margin. The top trace shows horizontal movement in direction of the blast, the middle one shows transverse movement and the lower one shows vertical movement.

Valves factory-coated with epoxy resin require no additional coating. Shown here is a new full-opening valve. The intricate shape would have made it difficult to coat this valve with ordinary pipe dope. Transco had manufacturer pickle the outside and spray it with two coats of epoxy resin and then give it a coat of aluminum paint. This gave sufficient insulation and eliminated the need for additional coating.

This line was designed for onstream pigging. A 30-degree lateral branch connection running to scraper launchers and receivers make it possible to run collapsible pigs.

This 30-degree branch connection features an unusual reinforcement that was developed in England. It is known as the Blair "triform" reinforcement.

Filling pump for hydrostatic test on the banks of the Tombigbee River in Alabama. The water is filtered to remove silt and solids before it goes into the line.

Bill Bowersox, chief inspector, and Bob Ledbetter, measurement engineer, inspect dead weight pressure gage on a test in Louisiana. Contractor on this spread was O. R. Burden.

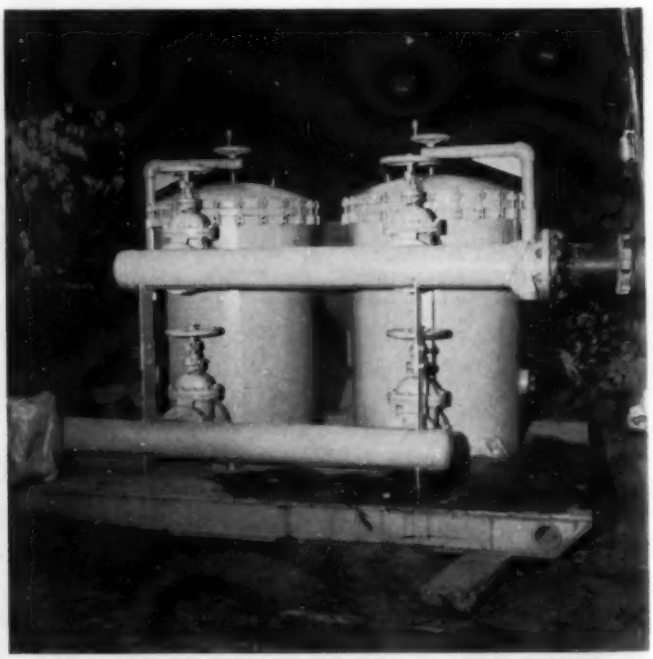
# Water Filters Pay Off on Line Cleaning

THE SLICK, TOUGH epoxy resin coating inside the pipe paid off during cleaning operations. Ordinarily hydrostatic tests drive water into the pores and mill-scale of the pipe lines. This moisture, though slight, would virtually make a pipe line inoperable in winter unless it is removed.

There are instances where companies have used as many as 34 squeegee pigs through lines after hy-

*Continued on Page 60*

Used and unused filter elements which came from filter after it had handled a million gallons of water. The elements are excelsior and rag type commonly used on analine dye filtering. There are 120 elements per filter unit handling 2500 gpm.



These twin filter units each contain 120 elements like those shown at left. Downstream samples of water showed little or no trace of sand and silt. Filtering made it unnecessary to run wire bristle pigs.

Seasonal floods made construction difficult on the Alaskan pipe line. Here, tractors working in tandem cross a small stream near Dot Lake, Alaska.

# Alaskan Products Line Completed

**Contractors complete construction and testing. Department of Defense takes over 625-mile artery to carry military fuels from year-round port at Haines inland to Fairbanks.**

By **MELVIN A. JUDAH,** PIPE LINE INDUSTRY Staff

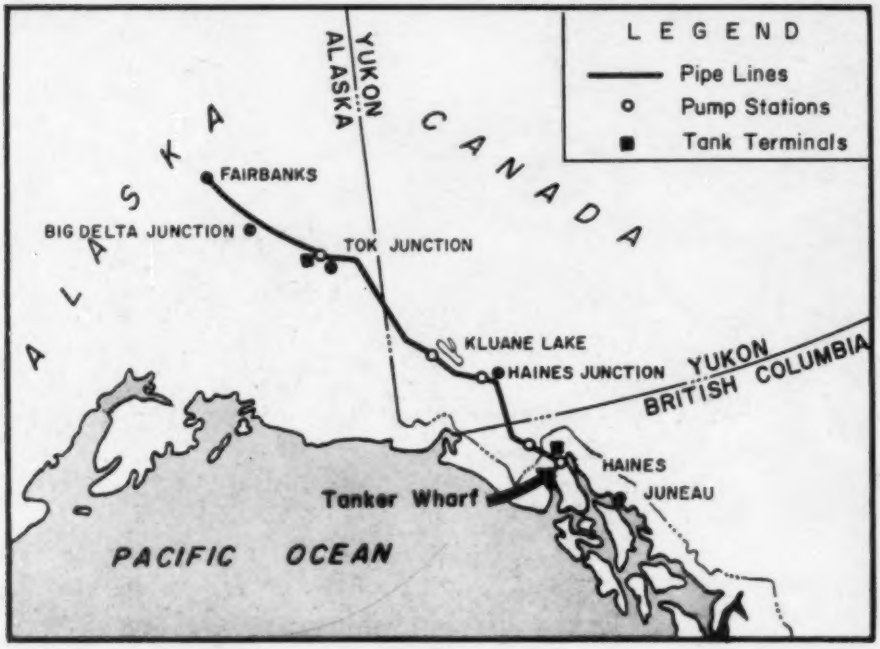
WORK, HEROISM, humor, and more work went into the laying of the 625-mile 8-inch products pipe line from Haines, Alaska, northwest through British Columbia and Alaska to Fairbanks. This project was undertaken in 1953 by the U. S. Army Corps of Engineers to serve the military's requirements for fuels in inland Alaska through the ice-free port of Haines.

Clearing of right-of-way began in December, 1953. Pipe was laid during the 1954 construction season. Station construction was completed during the first half of 1955. The line was tested and given a shakedown by the contractors this summer. Construction was a joint venture by Williams Brothers, Tulsa; McLaughlin Construction Company, Great Falls, Mont.; and Marwell Construction, Ltd., Vancouver, B. C., Canada. Now ready for operation the line is being turned over to the Department of Defense for regular service.

**Big Obstacles.** Work on the line was made difficult by the rough country and seasonal floods in low areas. Soils encountered included solid rock at isolated spots, gravel and sandy soils in low rolling areas, but the real problem came from movement of heavy equipment over muskeg and tundra underlain by permafrost soils. In many places the permafrost began just beneath the grass blanket and when the insulating cover was disturbed the underlying frozen soil thawed and became a quagmire. Equipment wallowed through mud down to the underlying ice.

Permafrost was generally limited to the valleys but was found occasionally on the tops of hills, too. Here the going was slow. Equipment frequently became bogged down and occasionally dropped "out of sight." Dragline retrieving was often a standard part of operations.

Flash floods caused some trouble, too, especially in the Klaune Lake region. Heavy rains and melting glaciers washed out sections of right-of-




way, highway, and bridges delaying construction. Many rock wash areas necessitated burial of pipe for protection. Swampy areas slowed construction, made detours necessary, and called for installation of concrete weights to keep the pipe from floating. In general, equipment performance was very satisfactory but maintenance costs were boosted by the rugged terrain.

**Ditching Machine Modified.** To ditch through rocky soils and permafrost, the ditching machine was "beefed-up" with a reinforced wheel having less spacing between buckets. A 12-foot diameter wheel having fourteen buckets was substituted for the standard 18-foot wheel. The result was a continuous digging cycle that eliminated "jarring" action on the ditcher and maintained smooth operation with less maintenance worries.

Most of the Alaskan line is above ground. Only 122 miles of ditching was required and that because of permafrost soils, road and river crossings. The ditcher-backhoe-clamshell combination dug the ditch through both icy and thawed soils. A backhoe and clamshell cleaned the ditch behind the ditching machine and dug the ditch where boulders and rocky soil was crossed. Blasting was required in solid rock and hard permafrost.

**Sub-zero Weather.** Right-of-way work began in December, 1953, and continued through the winter despite cold weather dropping temperatures to —60° F. Actual pipe line construction began on April 19, 1954, and continued until October 15, 1954. With the exception of some tie-ins the line was completed in less than six months. Station work began in April, 1954, continued until December and was resumed in late February this year.

At the peak of the 1954 construction season, 775 men were working on the Alaskan products line. Of this crew, 280 men were divided between the two pipe line spreads (one working in Canada and the other in Alaska). The remaining 495 men were working on the five pumping stations. The Alaskan line spread holds the construction record for the project, having welded 542 joints in a 12-hour day. This amounted to 4.31 miles of pipe.

Pipe for the line was 8⅝-inch outside diameter with a wall thickness of 0.277-inch. For stream crossings and about four miles of mainline on the discharge side of Station No. 2, pipe having a wall thickness of 0.312-inch was used. Pipe was a low-carbon, seamless steel with 0.215 maximum carbon content with analysis checking between 0.14 to 0.205 percent carbon.

Line-fill for the 625-mile line is 209,000 barrels of products. Under normal operations, the line will have a capacity of 12,000 barrels per day. The line was constructed at a cost of $40 million including supporting installations.

**Five Pumping Stations.** Terminal installations on the line are located at Haines and Tok Junction. At Haines, tankers will be unloaded at a 200-foot concrete dock T-wharf set on steel H-pilings. Depth of water at mean-lower-low-water is 40 feet at dockside. Twelve welded steel cone-roof storage tanks provide storage for 281,000 barrels of products. Universal manifolding and transfer pump facilities provide inter-transfer between the nine 30,000-barrel, two 5000-barrel, and one 1000-barrel tanks. The Tok Junction station has similar tankage with nine 30,000-barrel, three 5000-barrel and one 1000-barrel welded steel cone-roof tanks.

Five stations will pump products through the 625-mile line over mountains 3750 feet high. Only three stations are to be used for normal pumping operations.

### STATION DATA

**Station No. 1.**

Located on Lutak Inlet, three miles from Haines at an elevation of 35 feet.

Mainline pumping equipment—three quintriplex power pumps with 4½-inch plungers, each rated at 272 gallons per minute at 110 revolutions per minute with a maximum discharge pressure of 1200 pounds per square inch, units in parallel operation, each driven through a speed reducer by a six-cylinder diesel engine rated at 285 horsepower at 720 rpm.

**Station No. 2.**

Located 48 miles northwest of Haines on Haines cut-off highway at an elevation of 1300 feet.

Mainline pumping equipment—three 4 x 6 4-stage centrifugal pumps in series driven through speed increasers by six-cylinder diesel engines; maximum station discharge pressure is 1450 psi.

**Station No. 2A.**

Located 10 miles northwest of Haines Junction on the Alaskan Highway at an elevation of 2773 feet.

Mainline pumping equipment—two 4 x 6 4-stage centrifugal pumps in series; driven through speed increasers by eight-cylinder diesel engines rated at 450 brake horsepower at 840 rpm.

**Station No. 2B.**

Located on the Alaskan Highway at mile post 1124 at an elevation of 2673 feet.

Mainline pumping equipment—same as at No. 2A.

**Station No. 3.**

Located seven miles west of Tok Junction on the Alaskan highway at an elevation of 1591 feet.

Mainline pumping equipment—three quintriplex pumps with same specifications as those at Station No. 1 and two triplex power pumps rated at 44.7 gpm at 90 rpm using 3-inch plungers; maximum discharge pressure is 1200 psi; pumps are driven by diesel engines through speed reducers.

Triplex pumps move products to Big Delta, Eielson AF Base, and Ladd AF Base through the existing 3-inch Canol line. Take-off facilities at these points deliver to storage.

Each station has utility buildings for generators, boilers, and water and fire pumps. Warehousing, family apartments, a men's dormitory and necessary living facilities are also provided at the main stations.

**Some Humor Provided.** In spite of hard work 10 to 12 hours a day on the line there were lots of stories about the usual pipe line practical joke. Porcupines were found under truck seats and un-deodorized skunks in housing trailers. But bears provided the most excitement. There is the story of three inspectors who were walking along the right-of-way and glancing over their shoulders periodically for bear protection. When a bear showed up on the left, the inspector on that side made for a tree without wasting time to yell. The other two continued walking until the second man in file saw the bear and went up another tree. A few seconds later the third man noticed the bear when he glanced back and went up a third tree. The inspection team carefully maintained their altitude until a side-boom tractor came by and routed the bear.

**A team of ditching machine-backhoe and clamshell worked through the thawing soil to make 122 miles of ditch. Digging wheel of the ditching machine was reinforced for this job. Tow lines on equipment was a common sight in Alaskan mud.**

**Heroism Commonplace.** The Alaskan project didn't issue combat awards, but an everyday kind of valor that keeps men slogging through mud 12 hours a day was there. A single act stands out. On July 11, 1954, Francis Kirch rescued a family from a car that had run off a bridge into the Chistochina river. He was on a pipe delivery trip when he saw the car in the swift stream. Kirch tied down his truck horn to attract attention and using a tow chain as a rescue line, crawled into the freezing water to the submerged car. He rescued a baby, woman and man from the car one at a time. He then stopped just long enough to change clothes and have a cup of hot coffee before returning to the job. His actions were entered for Carnegie award consideration.

—The End

**Alaskan spread made a record number of welds on the Alaskan line, completing 543 joints—4.31 miles—in a 12-hour day. Here sideboom tractors line up the pipe ahead of tractor-mounted welding machine back down the line.**

A scene on Southern Pacific right-of-way between Ontario and Colton, Calif., where 16-inch mastic coated pipe was being laid. Pipe is trucked directly from yards near Los Angeles to the right-of-way, where it is strung.

# Railroad Pipe Line Is Nearing Completion

**Southern Pacific's line soon will be in operation, supplying Arizona with products from the Los Angeles and El Paso refining areas.**

By **GILBERT M. WILSON,** PIPE LINE INDUSTRY Staff

SOMETHING NEW in cross-country, common carrier pipelining was introduced to the industry when, in February of this year, D. J. Russell, president of Southern Pacific Company, announced that it planned to start work within 90 days on an 842-mile products line which would follow, for the most part, its own railroad right-of-way between Los Angeles and El Paso.

One of the first, if not the first, common carrier pipe lines to be built and operated by a railroad company, the new line will be available to refiners at both the Los Angeles and El Paso ends of the system. It represents a significant step, also, for California marketing companies for, although eastern California and Arizona areas traditionally have been served primarily by West Coast companies, by rail and truck, the existence of a products pipe line means that markets and footholds in those interior regions will be held and expanded.

Three refineries in the El Paso area are expected to use the line to serve markets in New Mexico and in the general eastern part of the territory traversed by the pipe line. Largest markets, however, are in the rapidly expanding Phoenix and Tucson areas of central Arizona and the intensely cultivated region of Imperial Valley and adjacent areas of southeastern California. Five Los Angeles area refiners already have made plans to tie in with the Watson station, with 10-inch lines being laid, or shortly to be laid, into that tank farm area.

From the standpoint of national defense, the pipe line is especially significant and important since, in time of emergency, the line could be modified so that products—or crude, if necessary—could be moved in either direction.

Southern Pacific Pipe Lines, Inc., a newly formed subsidiary of the railroad, is owner of the new pipe line system. Engineering Management, Inc., is the agent acting as manager of engineering and construction.

Three pipe sizes are being used in the line. Between Watson (in the Wilmington area south of Los Angeles) and Colton, a distance of 62 miles, 16-inch mastic-coated (yard coated) pipe will be used. From Colton to Phoenix, a distance of 356 miles, 12-inch wrapped pipe will be used. Between El Paso and Phoenix, a distance of 424 miles, 8-inch felt-wrapped pipe will be employed. Wrapped pipe, both 12- and 8-inch, after being cleaned and given a hot enamel coat, is given an asphalt coating and a glass fiber inner wrap. The 12-inch is given a glass fiber outer wrap, while the 8-inch receives a felt outer wrap.

**Many Types of Terrain.** Except for a few points, principally in desert regions, where the pipe line cuts across country to avoid grade problems or to avoid wide curves in the railroad, the pipe line follows the railroad right-of-way closely. Except for those areas where it traverses cultivated and populated regions, the right-of-way falls in generally arid and desert-like terrain with some mountain passes of moderate relief and numerous ravines and arroyos. About 2 percent of the route is rock requiring drilling and blasting. Some caliche also is encountered.

Elsewhere along the right-of-way, particularly in the Imperial Valley area of southeastern California, and in irrigated portions of central Arizona, numerous canals, irrigation ditches and road crossings are necessary. Six major river and canal crossings will require suspension spans. The longest of these, pilings for towers of which now are being driven, is the San Pedro river crossing north of Benson, Arizona, will be 1020 feet long. Other crossings requiring spans are: Coachella canal, 280 feet; Colorado river, (at a point a few miles north of

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Yuma) 840 feet; All American Canal, 140 feet; Yuma Main canal, 240 feet; and Rio Grande, 280 feet.

Except for the 16-inch mastic-coated pipe, which is trucked directly from the yard and strung along the right-of-way, all pipe is delivered by rail and stockpiled at various strategic points along the track and from there it later is picked up by truck and strung along the pipe line right-of-way. The pipe is delivered bare and is in random-length, 40-foot joints.

Main line gate valves are being placed at intervals of about 20 miles, and at various other key points, for hydrostatic testing of the line to 90 percent of yield strength.

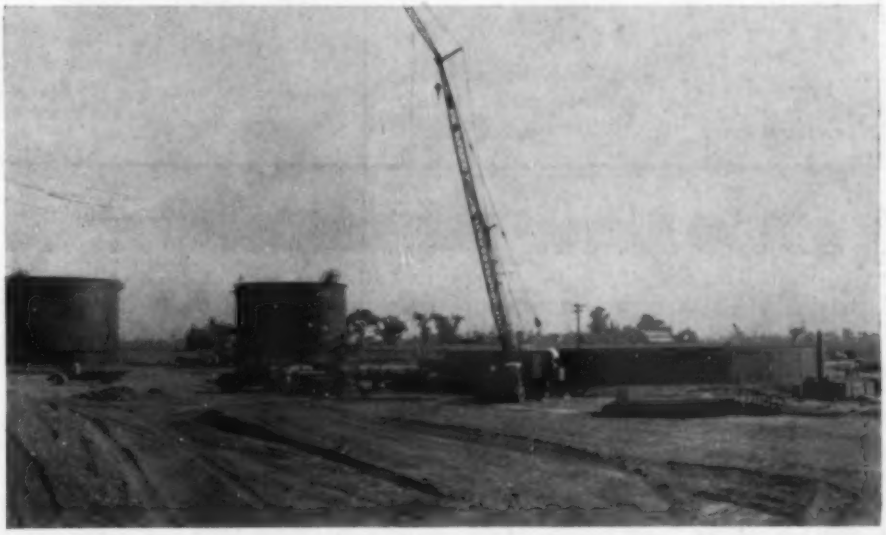
**Dust, Rattlesnakes, Washouts.** Ditching, welding and other operations are conventional. Except for an overly generous share of very hot weather, dust, rattlesnakes (one Arizona spread was killing 8 to 10 snakes a day), some washouts caused by sudden desert cloudbursts, and occasional problems presented by a restricted working area at some points along the right-of-way, no major difficulties were being encountered in the construction work.

Generally, and for the greater part of the route, the pipe line is kept at least 50 to 85 feet away from the center of the tracks. In some areas, such as in an area west of Colton, rows of eucalyptus trees beside the railroad right-of-way, and railroad telephone poles, restricted movement of tractors and welding equipment, making it necessary to do all the line-up work, welding, x-raying and coating of joints before the ditch was dug. Upon completion of the welding and coating of joints, the pipe was laid back as far as possible and the ditching machine then brought through, after which pipe was lowered and the ditch backfilled.

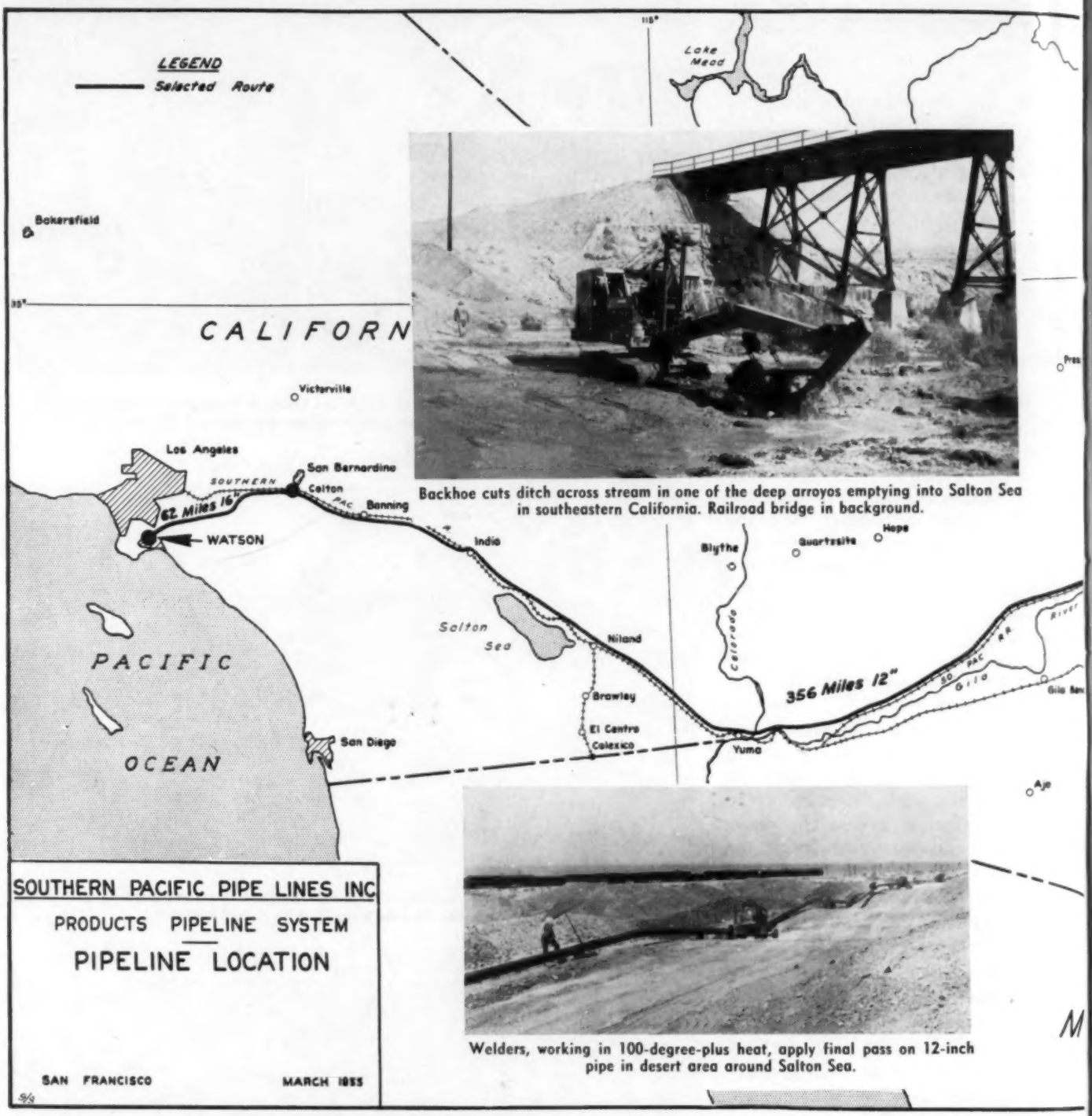
Specifications call for a minimum cover of 30 inches. However, in many agricultural areas, road crossings and numerous small arroyo and river crossings, such as in the below sea-level desert area east of the Salton Sea, a cover of from 4 to 5 feet is specified. In saline and alkaline soil areas, beneath highways, in cultivated areas, extra heavy river pipe was being laid. Some 40 miles of this heavier weight pipe was used in the Salton

**Portable compressor is hooked to section of 8-inch line ahead of dope gang on spread working in Southeastern Arizona area. Welds are soap-tested between 100 and 120 psi in the line.**

**Backhoe cuts ditch along right-of-way north of Tucson. Railroad foreman's house in background forced pipe line to bend away from its normal course.**



**With site graded, erection crews are assembling and welding storage tanks at terminal at Phoenix, Ariz. Large interior Arizona area will be served from this terminal. Products to be transported through line include regular, premium and aviation grades of gasoline, diesel and jet fuels.**




Backhoe cuts ditch across stream in one of the deep arroyos emptying into Salton Sea in southeastern California. Railroad bridge in background.

Welders, working in 100-degree-plus heat, apply final pass on 12-inch pipe in desert area around Salton Sea.

Sea sector. Pipe wall thickness for the entire pipe line ranged from 7/32- to 3/8-inch. The 16- and 8-inch pipe has a yield of 42,000 pounds per square inch and that of the 12-inch, 46,000 psi.

Occasional stretches of rock, requiring wagon drills and blasting, was encountered. Typical of these was the 4-mile section of rock in the Apache Pass area about midway between Lordsburg, N. M., and Benson, Ariz. Except for such intervals, most of the ditching was done by conventional trenching machines, with backhoes being used for digging out plugs and in cutting trench in difficultly accessible spots. Clam shells had to be used in some softer ground areas; also were used in digging gate valve bell holes and, at some points, where caving made it necessary to widen and clean the ditch sufficiently to get pipe to the required depth. A ripper had to be used at some points in hard sandstone-like ground and caliche encountered in the desert region in southeastern California.

For the most part, pipe generally is cradled into the ditch, leaving slack loops at intervals of from 400 to 600 feet. During the hot part of the day, a shade cover is pushed over the pipe within a few minutes after it is lowered. Tieing-in and back-filling is done at times when pipe temperatures are under 80° F. Pipe is lowered on to soft earth ditch pads, placed at intervals of about 25 feet, to prevent possibility of damage on sharp projecting rock in the bottom of the trench.

Line-up and hot pass crew work on 12-inch line as freight train roars by near Welton, Ariz., 35 miles east of Yuma.

Typical trenching operation in more level terrain beside railroad tracks near Salton Sea. Salton Sea is 240 feet below sea level.

**Joints Soap-Tested.** Before pipe (8- and 12-inch) is field coated, lengths of about 1000 feet or more are tested with air at pressures of from 100 to 120 psi using portable gas-engine driven compressors. Joints then are soap tested. About 15 percent of all welds are X-rayed in the field by a contract X-ray testing unit following up at the rear of each spread.

Welding operations on each spread usually consisted of a line-up and tack-welding crew followed by two welders who apply the stringer bead. Close behind are three welders who apply the hot pass and, farther to the rear, are final pass welders, of which there are from five to seven, each with his own machine. Tractors assigned to the final pass welders tow the machines, in leap-frog fashion, from the rear up to the front, spotting each welder so that he can handle four welds before having to be moved ahead.

In mid-September, some 85 to 90 percent of the pipe had been taken out to the right-of-way, and over 400 miles of the 842 total mileage had been completed. Work was under way at El Paso, Colton and Watson pump stations; also at tank farms at those terminals and, in addition, at Phoenix and Tucson, Arizona.

All three pump stations, at Watson, Colton and El Paso, are to be electrically driven, multi-stage centrifugal pumps. The Watson station, designed for a capacity of 42,000 barrels per day at 600 psi pressure between there and Colton, will have three 4-stage

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- ✓ Dealer Ledger Check
- ✓ Condition of Dealer Collections
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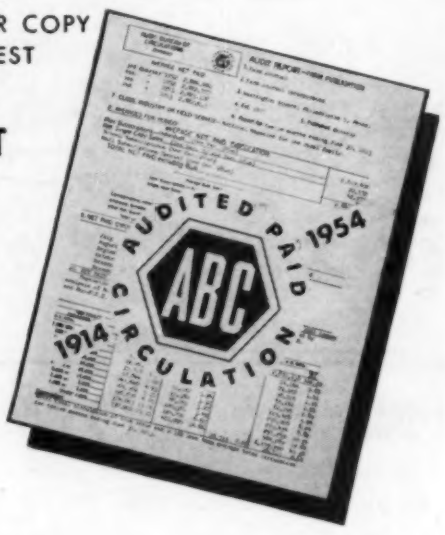
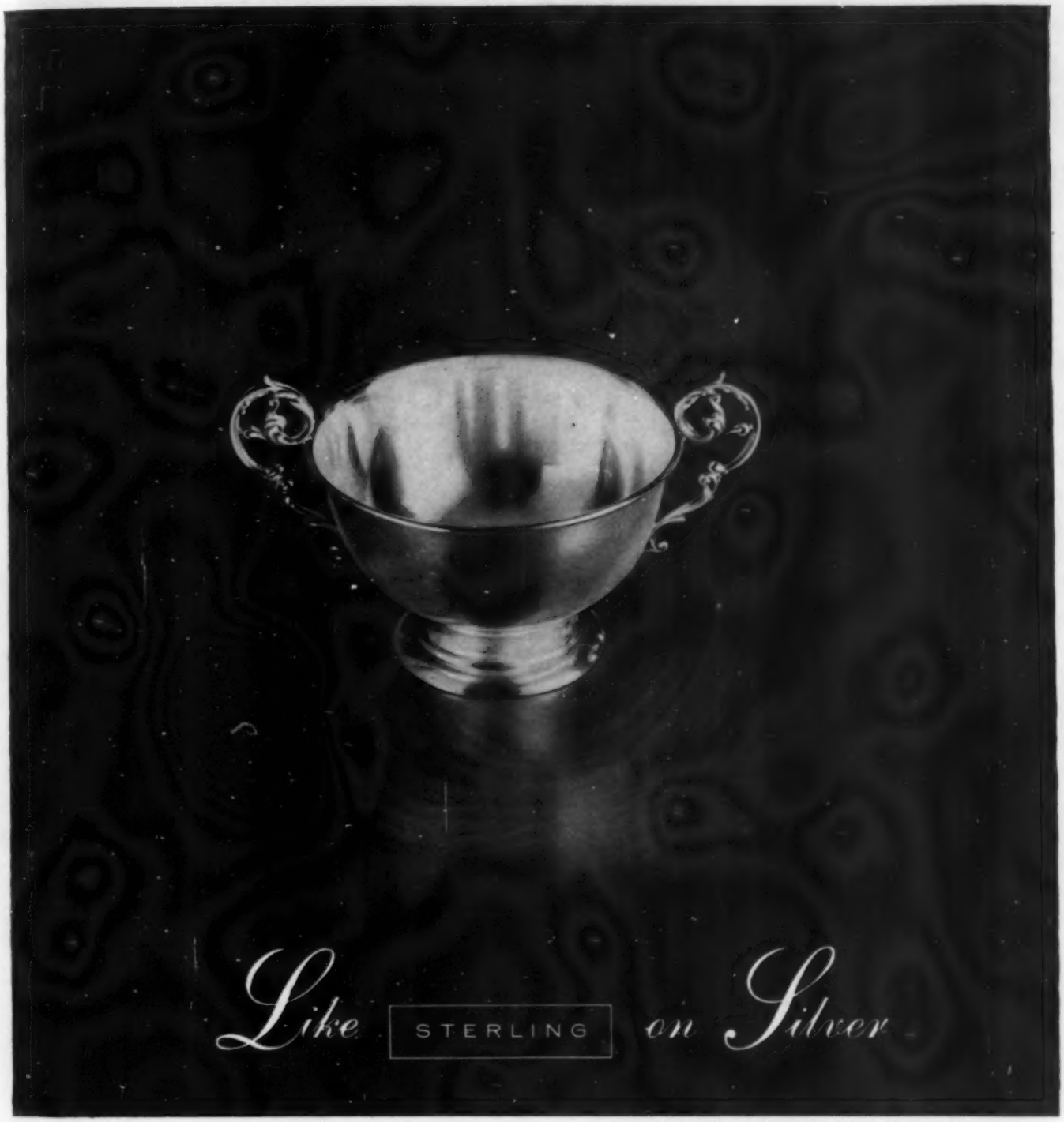



## PIPE LINE INDUSTRY

A.B.C. — 40 YEARS OF IMPARTIAL FACT-FINDING AND FACT-REPORTING




STERLING SILVER CHRISTENING BOWL BY REED AND BARTON

AUDITED PAID CIRCULATION ABC

**This symbol means quality circulation.** Only publications with paid circulations are members of ABC. They are worth the advertiser's dollar because they have proved to be worth the reader's dollar.

The dust flies as final-pass welding crews work on 8-inch line in dry lake area south of Willcox, Ariz. Welders in foreground await turn to be towed to front of line.

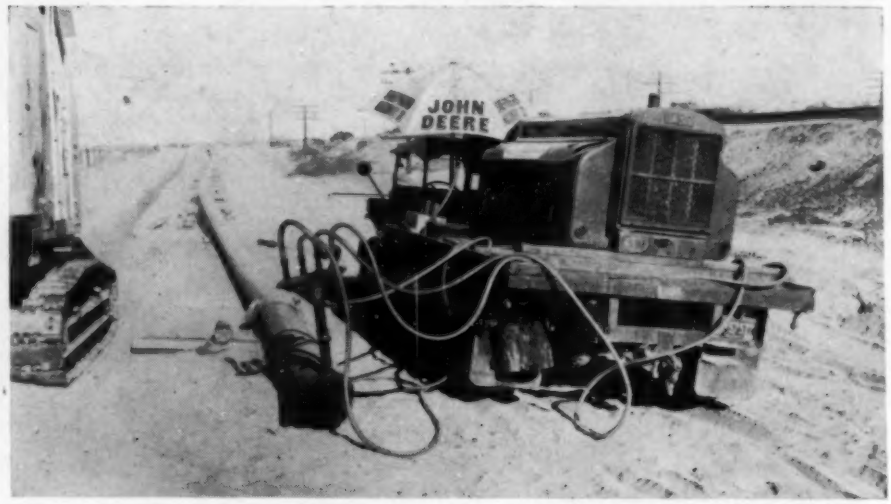
4 x 6 x 11 horizontal shaft, split case, double volute centrifugal pumps powered by three 300-horsepower, 2300-volt, 3600 rpm synchronous speed induction motors.

The Colton station, with a capacity of 36,000 barrels daily at 1350 pounds pressure, will have three 5-stage 6 x 8 x 11 pumps of the same type and will be driven by three 900 horsepower, 3600 rpm synchronous speed induction motors.

The El Paso station will have a 13,600 barrels per day capacity at 1320 pounds pressure, will be equipped with two 5-stage, 3 x 4 x 10 similar type pumps driven by two 300-horsepower motors of the same voltage and rpm as those at the other two stations.

Completion of the project is scheduled for around the end of this year.

Truck-mounted air compressor (below) was used in pressure-testing section of 12-inch line in the desert area east of Yuma. Pressure usually taken to 100-120 pounds and welds then soap-tested. Pipe line will be hydraulically tested upon completion and after it is in the ground.




**PIPE LINE CONTRACTORS:**

| | |
|---|---|
| Schedule 1: Lordsburg, N. M. to El Paso, Tex. —159 miles | Morrison-Knudsen Company, Inc., Los Angeles, California |
| Schedule 2: Lordsburg, N. M. to Tucson, Arizona—144 miles | R. H. Fulton & Company, Lubbock, Texas |
| Schedule 3: Tucson, Ariz. to Hassayampa River, Ariz.—155 miles | Hood Construction Company Lynwood, California |
| Schedule 4: Yuma, Ariz. to Hassayampa River, Arizona—127 miles | Macco Corporation & Alex Robertson Company, Paramount, California |
| Schedule 5 and 6: Yuma, Ariz. to Colton, Calif. —195 miles | Conyes Construction Corporation, San Pablo, California |
| Schedule 7: Colton, Calif. to La Habra, California—43 miles | J. E. Young Pipe Line Contractor, Inc., Los Angeles, California |
| Schedule 8: Watson, Calif. to La Habra, California—19 miles | Engineers Limited Pipeline Company, Los Angeles, California |

**PUMP STATIONS:**

| | |
|---|---|
| El Paso Pump Station | Robert E. McKee General Contractor, Inc. El Paso, Texas |
| Colton Pump Station | J. H. Pomeroy & Co., Inc. San Francisco, California |
| Watson Pump Station | J. A. McNeil Company, Inc. Alhambra, California |

**SPANS:**

| | |
|---|---|
| Rio Grande & Coachella Canal spans | Associated Pipe Line Contractors, Inc. Houston, Texas |
| San Pedro R. span | Ashton Building Company Tucson, Arizona |
| Colorado R., Yuma Main & All American Canal spans | Morrison-Knudsen Company, Inc. Los Angeles, California |

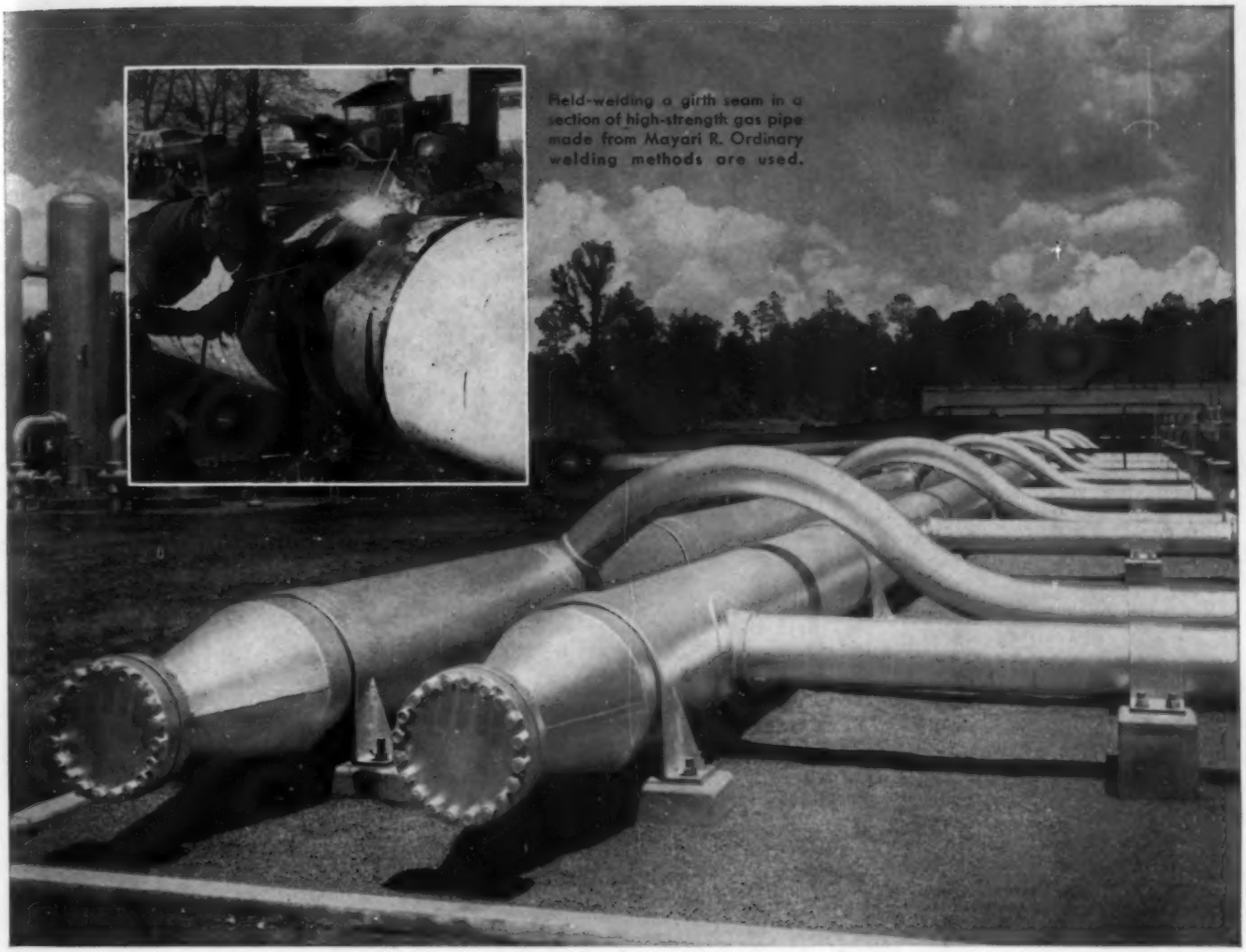
**TANKAGE:**

| | |
|---|---|
| El Paso, Watson, Niland (Calif) terminals | Chicago Bridge & Iron Works |
| Phoenix and Tucson terminals | Consolidated Western Steel Div. U. S. Steel |
| Colton terminal | Southwest Welding and Manufacturing Co. |

**PRINCIPAL OFFICERS of SOUTHERN PACIFIC PIPE LINES, INC.**

| | |
|---|---|
| President | D. J. McGanney |
| V. President | E. E. Mayo |
| General Manager | F. E. Kalbaugh |

**ENGINEERING MANAGEMENT, INC.**
**D. L. Roberts is project manager**



Field-welding a girth seam in a section of high-strength gas pipe made from Mayari R. Ordinary welding methods are used.

The 30-inch pipe, header tees and swages shown above were all fabricated from Mayari R, Bethlehem's high-strength, low-alloy steel.

# This high-strength pipe is easy to weld

Pipe made from Mayari R—Bethlehem's high-strength, low-alloy steel—has welding properties equal or superior to those of other pipe having the same load-carrying capacity. Simply follow your usual field-welding practices, using ordinary mild-steel rods. The weld metal will pick up enough alloy content to match the Mayari R's high mechanical properties. Under normal conditions, there's no need to preheat unless the pipe walls exceed ¾ in.

**Resists Fatigue**—Mayari R steel combines high-strength with extreme ductility. Its physical properties include a yield point of 50,000 psi min; ultimate tensile strength of 70,000 psi min; and an unusually high endurance limit of 60 to 70 pct of the tensile strength. As a result, pipe fabricated from Mayari R has the ductility, resistance to fatigue and the impact qualities needed to handle vibration and other severe stresses encountered at compressor stations.

**Savings of Materials and Money**—Due to its superior mechanical properties, high-strength gas pipe made from Mayari R may be used in lighter wall thicknesses than ordinary carbon-steel pipe.

Ask the nearest Bethlehem sales office for complete information about Bethlehem Oil and Gas Pipe, whether made of high-strength Mayari R, or ordinary carbon steel meeting ASTM A134 and API 5LX42.

**BETHLEHEM STEEL COMPANY**
**BETHLEHEM, PA.**

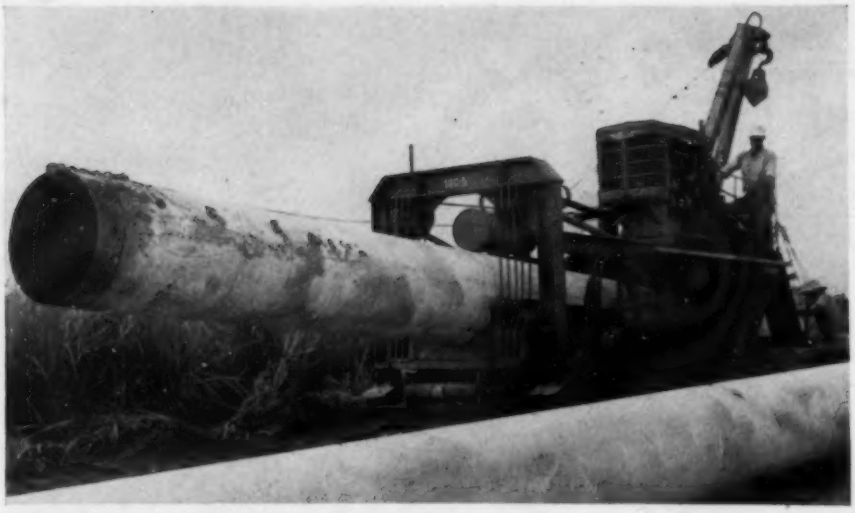
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

**BETHLEHEM OIL·AND GAS PIPE**



For more data on advertised products, use Readers' Service Cards, last page.



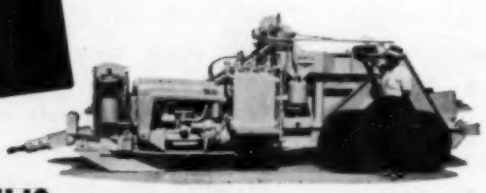
"BENDING" . . . for Transcontinental Gas Pipe Line Corporation . . . 5 miles of 36 inch and 25 miles of 30 inch laid in Louisiana.

**O. R. BURDEN CONSTRUCTION CORPORATION**

TEmple 8-3378 TULSA P. O. Box 5216

*Use the Reader's Service post cards, last page this issue for more information on advertised products*

**NOW... from CINCH**



**NEW VERTICAL HYDRAULIC PIPE BENDING MACHINE**

• The only vertical hydraulic pipe bender in the business. Lighter . . . faster . . . more compact. Easily transported on float truck without removal of tracks. Two sizes: 16" through 30"; 22" through 36".

Field proven on 36" line — you must see the new Cinch Vertical Hydraulic Bending Machine to appreciate its time-cutting, money-saving benefits.

*It's a Cinch . . . Cinch Machines are Used by the leading Pipeline Contractors*

CINCH
PIPELINE EQUIPMENT, Inc.

7020 Long Drive Phone: MI 5-2484
Houston 17, Texas

## Transcontinental Line

*Continued from Page 46*

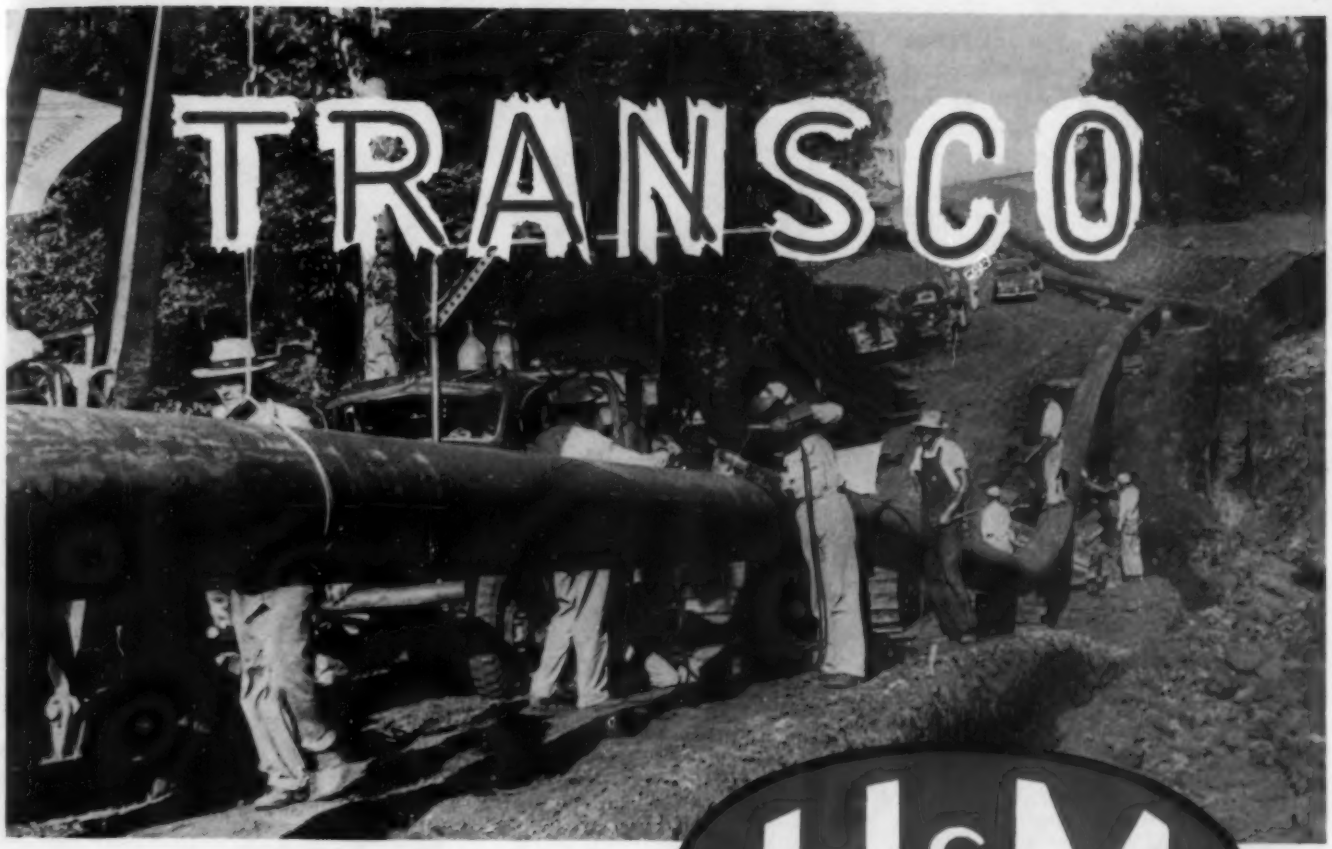
This is Pete McGehee's trap door used for launching pigs during line cleaning.

drostatic tests to remove water and dirt. Each one must be driven through the line with 20 to 30 pounds per square inch natural gas. Between the driving action of the gas and the wiping action of the pig the line is dried.

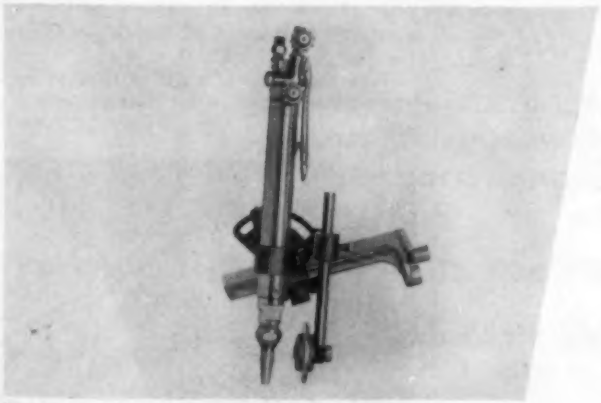
But this gas of course, costs money —and lots of it. And this was the reason Transco engineers set out to find a way to lower this expense.

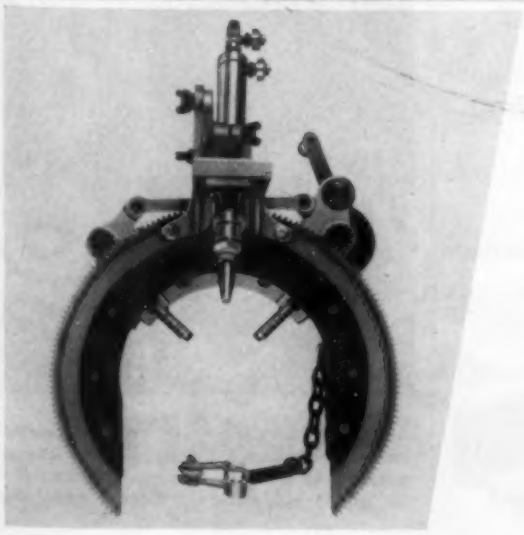
The internal coating of epoxy resin certainly minimized this operation. It prevented moisture from entering the

Soft bristle pigs were used on internal coating.




# BEVELED BY H&M





The impressive 580 mile, $83,000,000 looping project of the Transcontinental Gas Pipe Line Corporation is off to a good start in Alabama and Georgia. And also off to a good start are the hot gangs of the various contractors using H & M Pipe Cutting and Beveling Machines.

There's a lot of ground to be covered before this important loop can go on stream, and the man-hours saved through H & M semi-automatic beveling operations put that phase of the project ahead in a hurry.

H & M is an internationally known name. Known for speed, accuracy, and the economy of its initial cost. On top of that, the H & M is now the lightest machine in its class — actually 40% lighter than competitive equipment. Available in five sizes to cut and bevel pipe from 4 to 36 inches, the H & M line also includes out-of-round and shape-cutting attachments.

Yes, more facts from the field — the men who are laying the Transco line are helping prove again . . . **there is only one H & M.**

**PIPE BEVELING MACHINE CO.**

**311 East 3rd Street • Tulsa, Oklahoma**

**Phone Diamond 3-0241**



For more data on advertised products, use Readers' Service Cards, last page.

pores of the internal scale and when proper sized squeegees were run, some sections of the line were dry at the end of the third run. However, a minimum of five squeegees was usually run.

More important still, the pigs could be driven easily with 3 to 10 psi gas. This called for only about half as much gas per run.

Transco engineers are hopeful that the improved friction of the slick pipe may mean a more efficient operation.

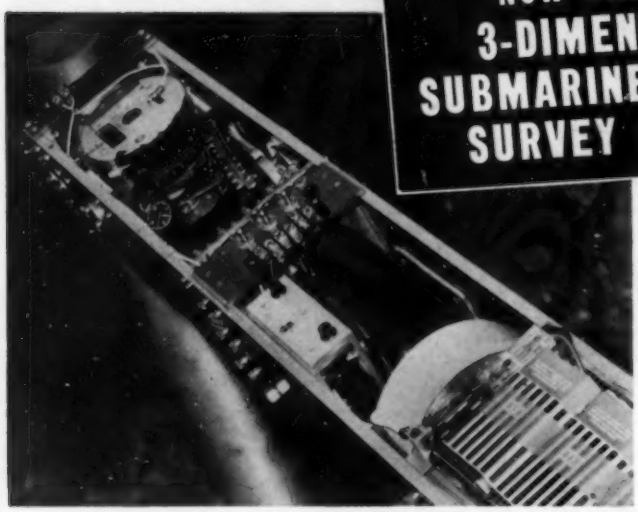
In the photo at left are Pete McGehee (left), Transco inspector, and Jack Hodges, Midwestern spread superintendent. McGehee has invented a collapsible pig for onstream cleaning which Transco is putting in service. Photo at right shows Transco Chief Engineer Raymond Crowe (left) and Inspector Freeman Ueckert on job in western Georgia.

Certainly, the line is less subject to deposition of condensates and dirt than ordinary pipe lines.

Another factor which greatly aided the cleaning of the finished sections of lines was the use of water filters during the line fills for hydrostatic testing. Virtually all the sand and the greater part of the silt was removed before the water entered the line. This eliminated the need for stiff wire-brush pigs. Soft bristle pigs were used instead and in some instances no scraper pigs were deemed necessary.

*(Turn the page for a list of principal contractors and suppliers for Transcontinental's line.)*

Shown here is the answer to the question: "How much damage do welds do to internal coating?" It is about half an inch on either side of the weld. Transco did not repair this damage.


● **No longer need you worry about the unknown position of pipe under water. Sperry-Sun's new self-contained survey service accurately charts position of pipe.**

***Here's how it works:***

Instrument rolls through the pipe to be surveyed. Pipelines that are 10" and larger can be surveyed. At specific intervals (during still time) a camera photographs the surveying elements. Pipeline direction is read to 10 minutes and slope to 3 minutes of angle. A double run survey can be made on 6000 feet of pipe in approximately 8 hours.

From the survey you receive all calculations and projections in both horizontal (plan) and vertical (profile) planes. From it you know exactly where pipe is.

● **Write for surveying service charges and additional information.**

**SPERRY-SUN WELL SURVEYING COMPANY**

**3118 BLODGETT AVENUE • HOUSTON, TEXAS**

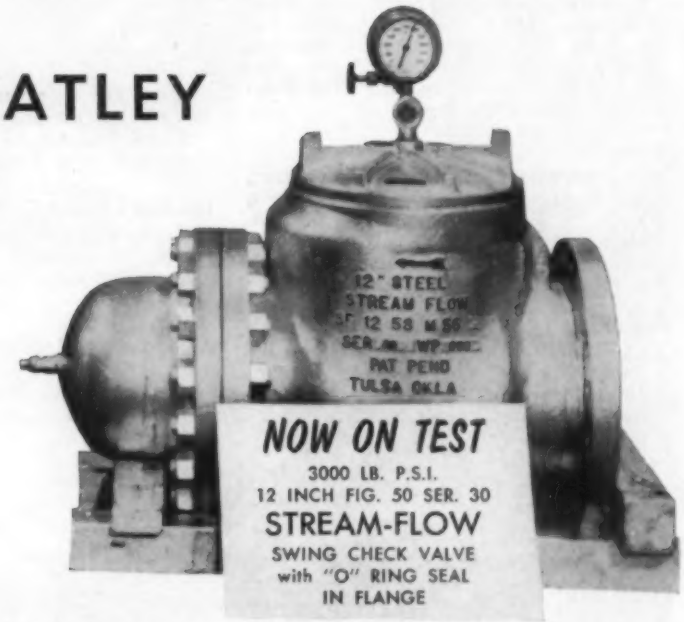
# THIS IS THE VALVE

## REFERRED TO IN THE

# "O" RING STORY

## THE CHARLES WHEATLEY

# STREAM-FLOW SWING CHECK VALVE




**DURING THE HOUSTON OIL SHOW, THIS 12" SERIES 30 CHARLES WHEATLEY STREAM-FLOW SWING CHECK VALVE USING "O" RINGS FOR GASKETS HELD 3,000# PRESSURE FOR 7 FULL DAYS.**

**THE RESULTS OF OTHER TESTS FOR THE CHARLES WHEATLEY COMPANY:**

12" Series 30, raised face flange with assorted flat gaskets, 14 tests were made and leakage occurred between 1,000# to a maximum of 1,700#, with an initial bolt stress of 66,000#.

12" Series 30, flat face flanges with "O" ring seal, 5,100# pressure was reached before leakage occurred with an initial bolt stress of 3,000#.

Sizes From ½" to 36"—From 1 oz. to 10,000# W.P.

***Immediate Shipment on Most Valves***

**AVAILABLE THRU YOUR SUPPLY STORE**

To learn more about Charles Wheatley Stream-Flow Swing Check Valves, write.

## CHARLES WHEATLEY COMPANY

**414 South Detroit** **TULSA, OKLAHOMA** **PH. CHerry 2-8256**

# Principal Contractors, Suppliers For Transcontinental's New Line

**Contractors**

Associated Pipeline Constructors, P. O. Box 13216, Houston 19. O. R. Burden Construction Corporation, 6702 E. 21st, Tulsa. Midwestern Constructors, 105 N. Boulder, Tulsa. Panama-Williams Company, 1417 Melrose Building, Houston. Williams Brothers Company, National Bank of Tulsa Building, Tulsa. Houston Contracting Company, 2707 Ferndale Place, Houston 6.

**Pipe**

Consolidated Western Steel Corporation, Terminal Annex, P. O. Box 2015, Los Angeles 54. Kaiser Steel Corporation, 1924 Broadway, Oakland, Calif. National Tube Company, 525 Wm. Penn Place, Pittsburgh, Penn.

**Valves**

W-K-M Manufacturing Company, Inc., 220 Roberts Street, Houston 1. Grove Valve & Regulator Company, 65th & Hollis Street, Oakland 8, Calif. Rockwell Manufacturing Company, 400 N. Lexington Ave., Pittsburgh 8, Penn.

**Fittings**

Ladish Company, Cudahy, Wisconsin. Taylor Forge & Pipe Works, P. O. Box 485, Chicago 90. Tube-Turns, Inc., 224 East Broadway, Louisville, Ky.

**Scraper Traps and Launchers**

Thornhill-Craver Company, Inc., 1111 Lockwood Drive, Houston 1. Taylor Forge & Pipe Works, P. O. Box 485, Chicago 90. Yale Machine Works, 4403 Yale Street, Houston 8.

**Rigs and Scrapers**

T. D. Williamson, Inc., 2733 East Latimer, Tulsa 9. Cleaner Pipe Lines Company, 1900 Armour Road, North Kansas City 16, Mo. Pipe Line Cleaners Company, Fort Madison, Iowa. Morris, Young & Owens Company, 1200 Old Spanish Trail, Houston.

**Coating**

S. D. Day Company, 1973 West Gray, Houston. Gulf States, 300 Christy Place, South Houston, Texas. Lynes, Incorporated, 7042 Long Drive, Houston 21.

**Internal Coating**

Napko Paint & Varnish Works, 406 N. 79th St., Houston. Coast Paint & Lacquer Company, Inc., P. O. Box 1113, Houston.

**Application of Internal Coating**

CRC Engineering Company, P. O. Box 2073, Houston. Rosson-Richards Company, Box 6886, Houston 5, Texas.

**Kraft Paper**

Houston Paper Company, 1921 Franklin, Houston. Brawner Paper Company, 209 North Travis, Houston.

**Concrete Coating and Clamps**

CRC Engineering Company, P. O. Box 2073, Houston.

**Testing** (subcontractor)

Walnesco Hydraulic Pipe Line Testing Service, 324 E. Wisconsin Avenue, Milwaukee. Texas Testing Company, 2930 Pease, Houston. Williams Pressure Control Service, Commercial National Bank Building, Shreveport. Halliburton Oil Well Cementing Company, P. O. Box 112, Duncan, Okla.

**Rockshield**

Keystone Pipe & Supply Company, Burk Burnett Building, Fort Worth. The Ruberoid Company, 500 Fifth Avenue, New York.

**Glass Fiber Wrap**

The Philip Carey Manufacturing Company, Lockland, Cincinnati 15. Owens Corning Fiberglas Corporation, Nicholas Building, Toledo 1.

**Felt**

Nicolet Industries, Inc., 70 Pine Street, New York 5. The Ruberoid Company, 500 Fifth Avenue, New York. The Philip Carey Manufacturing Company, Lockland, Cincinnati 15.

MUCH OBLIGED FOR YOUR ACCEPTANCE!

• Today—Fieldjointers effectively link approximately 150 miles of 36" pipe on Transco's $83 million looping project.

Distributor:

PITT-CHEM Coal Tar Enamels • RUBEROID Asbestos Felts • FIELDJOINTERS • FORMULA 291—Skinsaver

**One year ago S. D. Day announced distribution of Fieldjointers to the industry.**

Since S. D. Day announced easy-to-use Fieldjointers a year ago, your acceptance of this sure, simple and economical new method of coating field joints has been overwhelming. Transcontinental—and many leading companies—have found that Fieldjointers can effectively solve the problem of coating joints with a minimum of labor and coating costs.

Manufactured under maximum pressure of very heavy, durable moisture-proof fibertex board, the Fieldjointer is calendared to resist moisture under high pressures. It is wide enough to overlap several inches of the previously coated and wrapped pipe; heavy inserts hold it ¼ inch away from the pipe. This space is filled with hot enamel—effectively coating the weld at bottom, sides and top. Available for pipe from 1" to 36" in diameter. Try Fieldjointers—and see how it saves on labor and coating costs.

**S. D. DAY COMPANY**

**1973 West Gray  Houston, Texas  Phone JA 8-2431**

The same skill and know-how that laid 67 miles of 36" and 30" pipe between Kings Mountain and Lexington, N. C. on Transcontinental Gas Pipe Line Corporation's great line to New York City is applied to every line laid by Panama-Williams . . . whether it's 36" or smaller.

PANAMA-WILLIAMS COMPANY
PIPELINE CONTRACTORS
HOUSTON

# Rules of Thumb

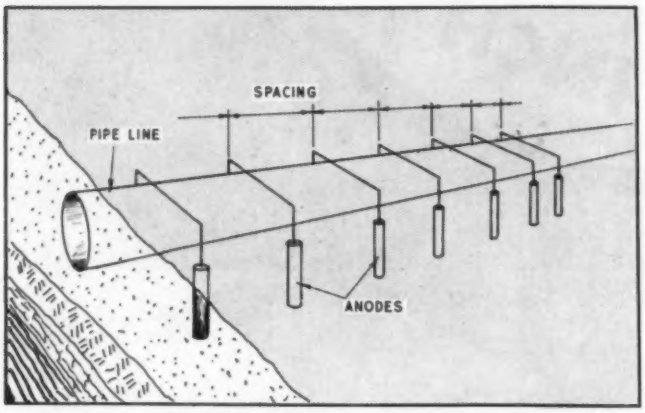
## FOR THE PIPELINER'S NOTEBOOK

### $15 Per Rule of Thumb

These formulae from the pages of engineers' own notebooks yield rough, but reasonably accurate answers for design, maintenance and supply questions. The Editors will pay $15 for your pet Rule of Thumb. Send your Rule of Thumb to Donald M. Taylor, Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1.

Corrosion Protection

### —13—How to estimate the number of magnesium anodes required and their spacing for a bare line or for corrosion "hot spots."




**Soil and pipe line conditions will vary widely but where these given assumptions hold, an estimate can be made for test installations using this method.** First find the area of pipe to be protected, multiply by the milliamperes per square foot necessary to protect the line and divide by design output of an anode in this type soil. This will give the number of anodes required; to find spacing, divide number of anodes into the length of line.

**Example:** Find the number of 17-pound magnesium anodes needed and spacing used to protect 10,000 feet of bare 4-inch pipe line in a corrosive soil having a resistance of 1000 ohms per cubic centimeter. Assume a current requirement of one milliampere per square foot, and that the anode output curve shows an output of 100 milliamperes per anode in this type soil.

$$\text{Area of pipe} = \frac{4 \times 3.14}{12} \times 10{,}000 = 10{,}500 \text{ square feet}$$

$$\text{Total current requirement} = 10{,}500 \times 1.0 = 10{,}500 \text{ milliamperes}$$

$$\text{Anodes required} = \frac{10{,}500 \text{ milliamperes}}{100 \text{ ma/anode}} = 105 \text{ anodes distributed}$$

$$\text{Spacing} = \frac{10{,}000}{105} = 95 \text{ feet}$$

Similarly find the number of anodes required to protect ten 100-foot long "hot-spots" on a 4-inch line assuming a 100 milliampere output from a 17-pound magnesium anode. Estimate as follows:

$$\text{Area of each "hot-spot"} = \frac{4 \times 3.14}{12} = 105 \text{ sq. ft.}$$

$$\text{Anodes required} = \frac{105 \text{ sq. ft.} \times 1.0 \text{ ma per sq. ft.}}{100 \text{ ma per anode}} = 1.05$$

one 17-pound magnesium anode will produce approximately enough current in 1000-ohm soil to protect one of these "hot-spots."

Ten anodes required for "hot-spots" on this section of line.

(Note: For these rules the protective criterion is —0.85 volts pipe-to-soil potential using a copper-copper sulfate reference electrode; or a negative change of potential of as much as —0.25 volts. Soil and pipe line conditions vary widely, so it is well to consult an experienced corrosion engineer in the design of a complete cathodic protection system.)

**TOO MANY THUMBS** . . . The editors apologize for omitting some important conditions in the Rule of Thumb—Miscellaneous—24 appearing in the September 1955 issue. This rule is intended for use in estimating the performance of station fire hoses. It applies only for 100 foot lengths of 2-inch hose fitted with an open nozzle and where only the working pressure is varied. Application of the rule is therefore limited by these conditions. If you are clipping and saving these rules, you may want to remove this one from your "Rule of Thumb Notebook."

# Are you Buying "PHANTOM" Pipe Lines?

Suppose your specifications call for 18-inch (O.D.) steel pipe with a minimum wall thickness of .219-inch. But the nearest wall thickness available from your pipe supplier is .250-inch. That 1/32-inch difference would mean almost 15 extra tons of metal in every mile—almost enough metal for an additional 4,000 feet of 6-inch pipe with a wall thickness of .109-inch.

You can keep "ghost pipe" to a minimum by specifying Armco Welded Steel Pipe for all your line pipe needs. With the 132 combinations of diameters and wall thicknesses, it's easy to get exactly the pipe you need. Diameters range from 6 to 36 inches; wall thicknesses from 9/64" to 1/2".

You save too with extra long lengths of Armco Pipe. There are fewer sections to handle and fewer joints to make over a given length of line.

Armco Welded Steel Pipe is recommended for requirements in the Natural Gasoline and Natural Gas Divisions and wherever else you need dependable line pipe. Write us for complete data. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 4275 Curtis Street, Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

**Armco Welded Steel Pipe**

ARMCO

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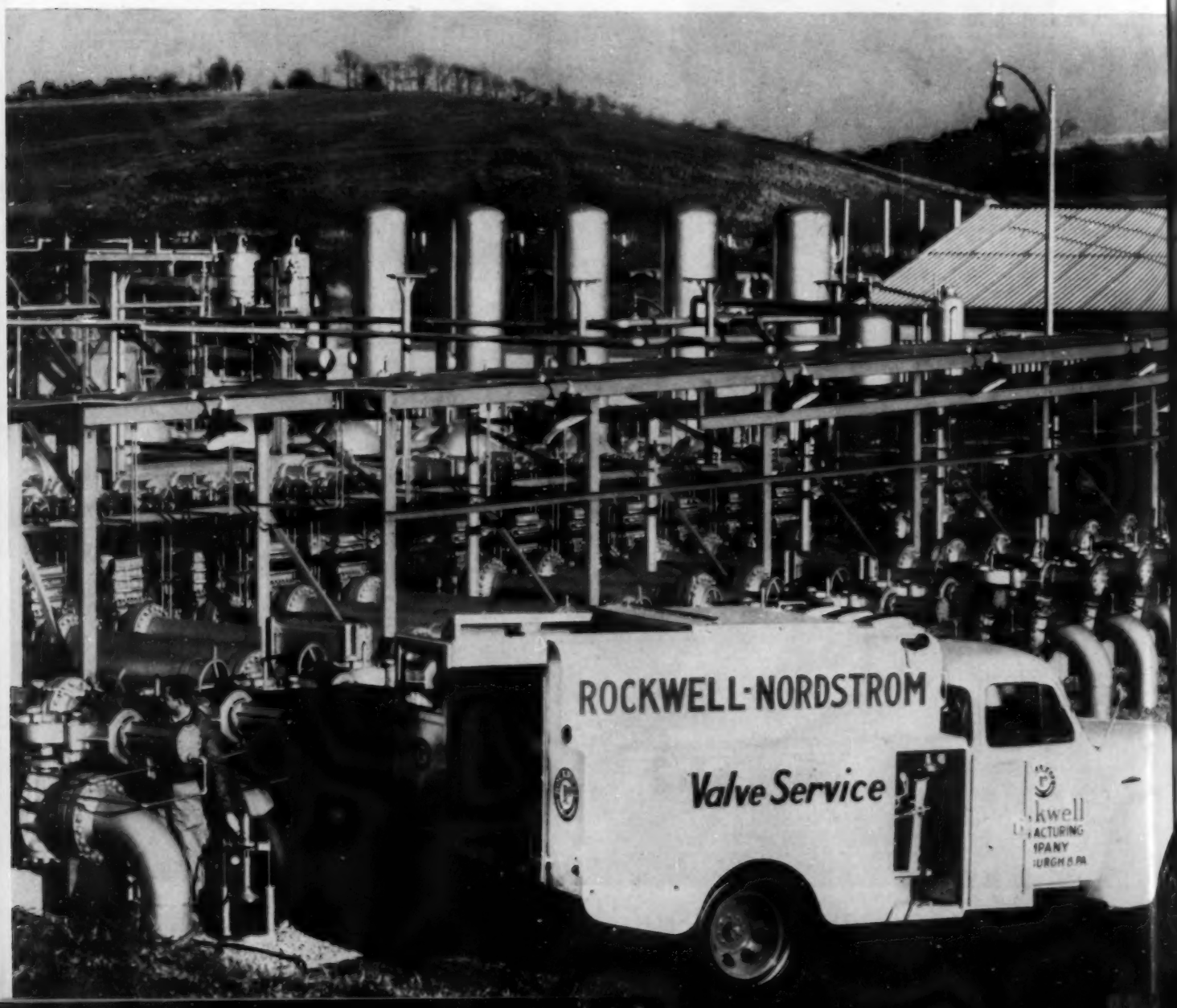
# NEW! Rockwell

## A Mobile Service For Low Cost Contracted Valve Maintenance



# "Workshops on Wheels"

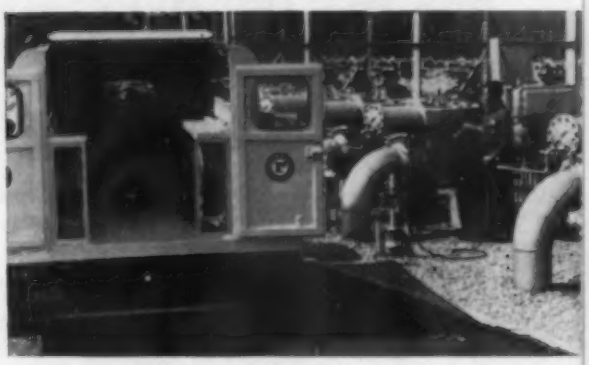
**WHAT IT IS:** Rockwell's new Mobile Maintenance and Lubrication Service is designed to increase the efficiency and lower the cost of valve maintenance for oil and gas field installations, refineries, pipe lines, chemical plants, and processing plants. It is made possible by a fleet of specially-built valve "workshops on wheels," manned by factory-trained experts, and equipped to provide complete "on the spot" service on a regular schedule, tailored to fit individual needs.

**HOW IT WORKS:** A Rockwell engineer, thoroughly familiar with Nordstrom valve design and maintenance, as well as with your particular process requirements, studies your installation in terms of its service needs. Then a mutually agreeable schedule is established for the servicing of your valves. From that time on, you have no valve maintenance worries; they become the responsibility of a Rockwell service expert. At regular intervals he will handle all servicing and lubrication quickly, efficiently, working from one of Rockwell's "workshops on wheels." These Rockwell-designed trucks are equipped with the most advanced lubrication, servicing and repair equipment, and built to operate with complete safety under any fire or explosion control requirements.

**WHAT IT COSTS:** Naturally, the price of this new planned maintenance and lubrication service varies with the size and number of valves, and with frequency of service. Definite prices are established after a Rockwell engineer has studied your individual requirements.

Actually, this new Rockwell service saves far more than it costs. It saves on fixed maintenance overhead. It saves on valve repairs. It saves by reducing costly down time. Because it is expert *preventive* maintenance performed on a regular schedule, it saves by spotting potentially expensive trouble *before* it gets expensive. And, of course, it saves on valve replacement costs because your valves will give you longer, more economical service life.

Pre-planned "on-the-spot" lubrication and service . . .



. . . performed by scientifically equipped experts . . .

. . . cuts maintenance, down time, and replacement costs.

*The new Rockwell Mobile Maintenance and Lubrication Service is another extra value you can get only from the world's oldest and largest maker of lubricated plug valves. Its sole purpose is to help you get the best possible valve service at the lowest possible cost. For more detailed information, send the coupon below.*

## ROCKWELL-
## Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

Rockwell Manufacturing Company
400 N. Lexington Avenue
Pittsburgh 8, Pennsylvania

☐ Please send me complete information about Rockwell's new Mobile Service.

☐ Please have a Service Engineer survey my valve maintenance needs.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

REDUCE THE CHANCE OF USING THE WRONG VALVE LUBRICANT

ELIMINATE LARGE WAREHOUSE STOCKS

ONLY 4

DESCO

PLUG VALVE LUBRICANTS

ARE ALL YOU NEED

no matter what passes thru your valves!

No matter what the fluid or its temperature, Desco Lubricants are guaranteed to STAY in your valves . . . and 4 types are all you need.

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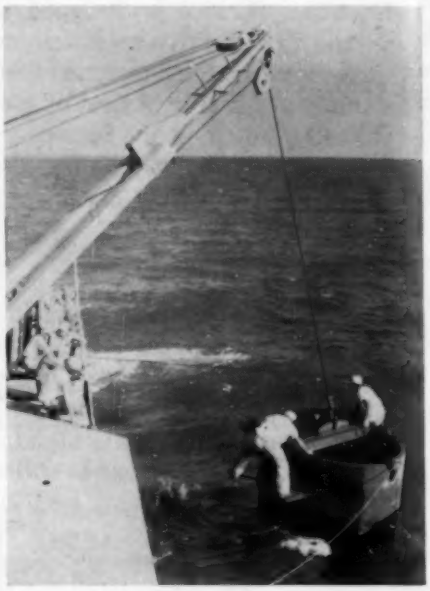
## WHAT'S HAPPENING

# IN PIPE LINE CONSTRUCTION

## First Under-Sea Hot Tap Completed

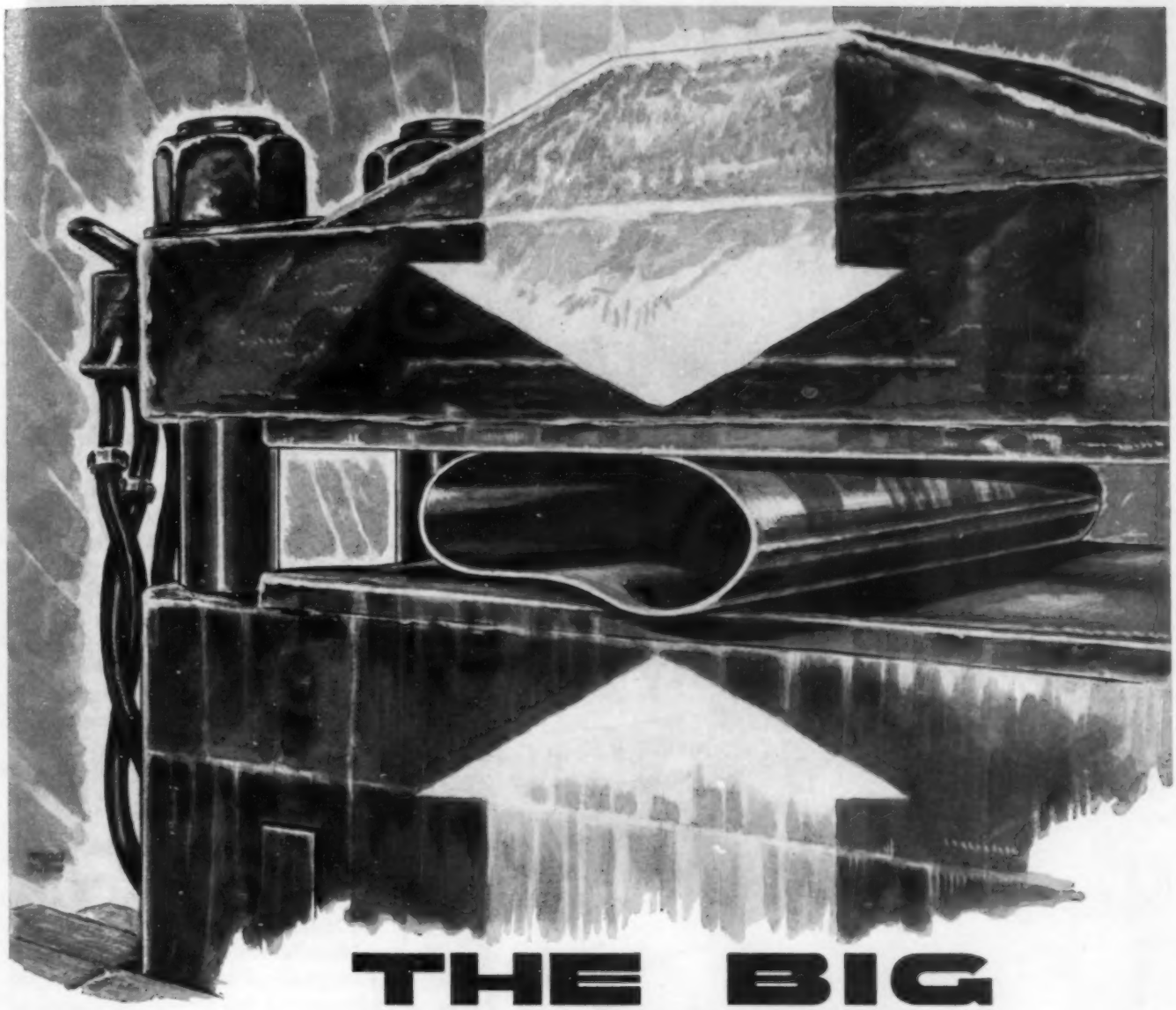
Another significant event in the development of offshore oil operations took place recently when Brown & Root, Inc. successfully completed the first hot tap made on a line submerged under open sea. The tap was made on Magnolia Petroleum Company's 10-inch line in Block 95 in the Eugene Island area off the Louisiana coast. When the tap was finished, production of a newly-completed well began flowing into the pipe line. Using this technique, it is now possible to tie an offshore well into a submerged line without having to raise it or go through costly construction.

Made in 25 feet of water in the open Gulf, the operation required a lot of imagination, preparation, and—finally—calm seas. To do the job, Brown & Root came up with a steel cylinder 30 feet long and eight feet in diameter, hinged at the top and split down both sides like a clam shell bucket. A section of line was uncovered by a dredge, the split caisson lowered over the line and then clamped together. Then the bell was pumped out, providing the welders a dry caisson so they could work on the submerged pipe line. The tap was made and the caisson was unclamped and raised by a derrick barge.



First step in making the under-sea hot tap is to lower caisson over the uncovered pipe section. Waves and current make the job difficult even in "calm" seas. Once the caisson was secured at the bottom, steel pilings were driven at four corners to steady it.

Success came late at night, as the tapping machine was brought out of the caisson with the coupon. Important phase of job was keeping the caisson steady and dry. Piling required a network of braces; pump for the caisson is rigged at right.



# THE BIG SQUEEZE

The "big squeeze" is one of many tests to which Youngstown Electric Weld Line Pipe is subjected, to assure you a top quality product. In our process both ends of each length are cutoff and crush-tested in a massive press.

Each end section of the pipe is positioned in the press so that the weld receives the maximum effect of a steady crushing action of thousands of pounds pressure. In the "big squeeze" the weld holds fast—stronger even than its parent metal. Then the pipe continues through subsequent operations and further tests — — PROVEN and READY for efficient service in the field.

* * *

Five reasons why Youngstown Electric Weld Line Pipe is your best buy: (1) It bends readily; (2) Wall thickness is uniform; (3) Line up characteristics are excellent; (4) Weldability is outstanding; (5) Long lengths save you time and trouble. The Youngstown Sheet and Tube Company, Youngstown 1, Ohio. Sales and service offices throughout the oil and gas producing areas.

**Youngstown**

ELECTRIC WELD LINE PIPE

QUALITY · YOUNGSTOWN · SERVICE

**THE YOUNGSTOWN SHEET AND TUBE COMPANY** *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices Youngstown, Ohio · District Sales Offices in Principal Cities.

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# Parts of Pacific NW-El Paso Plans Denied

Hearings on the Pacific Northwest Pipeline Corporation application to import Canadian gas continue following action by the FPC in which it dismissed parts of four out of six alternate plans submitted by El Paso Natural Gas Company and that part of Pacific Northwest Pipeline Corporation's application involving delivery of gas to El Paso Natural at Mountain Home, Idaho. The FPC said it took the action "in the interests of orderly procedure."

Pacific Northwest is seeking to import Canadian gas for customers along its new line and deliver gas to El Paso Natural at one of several points proposed earlier (see PIPE LINE INDUSTRY, June 1955, page 92, and September 1955, page 86). Pacific NW originally planned to deliver 250,000 Mcf per day to El Paso at Mountain Home, but later sought to eliminate this sale and, instead, sell this quantity of gas to other customers along its system. Pacific Gas & Electric Company then declined to take delivery of the gas from El Paso at the points proposed in the plans "B" and "C": Reno, Nev., and Klamath Falls, Ore. Soon after, El Paso learned that PG&E wouldn't take the gas at San Joaquin County, Calif., as proposed in a fourth plan "D." Under El Paso Natural's first proposal, Plan "A," it would have purchased gas from Pacific NW in the San Juan Basin, but Pacific would not make the sale there.

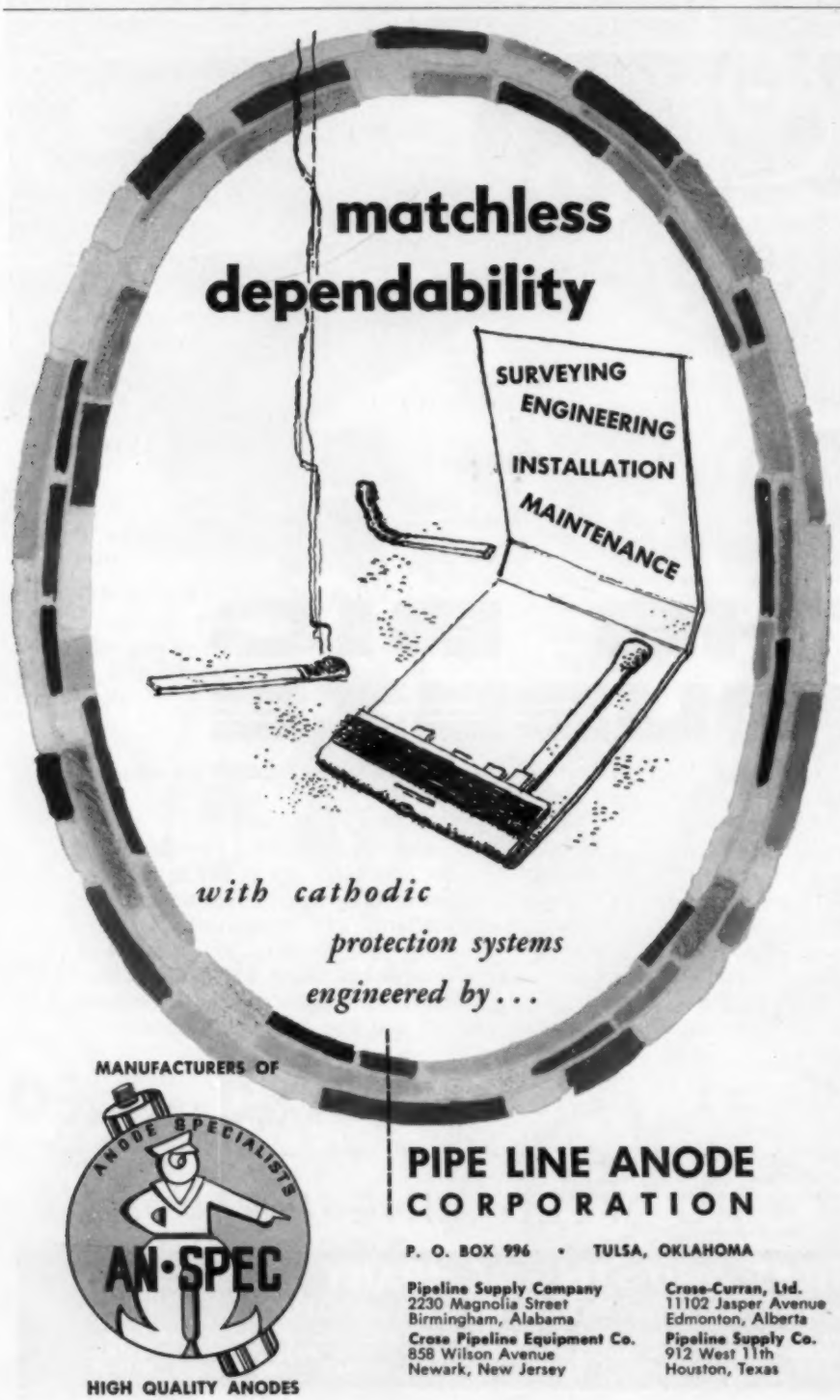
All six of El Paso Natural's plans for a proposed construction program include facilities for transportation of up to 300,000 Mcf per day from the Permian Basin and San Juan Basin. Deliveries would be made to PG&E, Southern California Gas Company, Southern Counties Gas Company of California, Nevada Natural Gas Pipe Line Company and other customers along El Paso Natural's line in Arizona, New Mexico and Texas.

El Paso's plans "E" and "F" propose facilities to take the 300,000 Mcf per day from the Permian and San Juan Basins, but do not mention the additional 250,000 Mcf delivery from Pacific objected to previously. Plan "F" proposes that El Paso acquire up to 50,000 Mcf per day at the Canadian border, and, under an agreement with Pacific NW, would exchange this gas for an equal quantity to be furnished by Pacific to El Paso in the San Juan Basin. El Paso also proposed to deliver 50,000 Mcf per day from its production in the Pinedale, Wyo., area to Pacific NW near the Big Piney field in Wyoming. An equivalent volume of gas would be returned by Pacific NW to El Paso in the San Juan Basin.

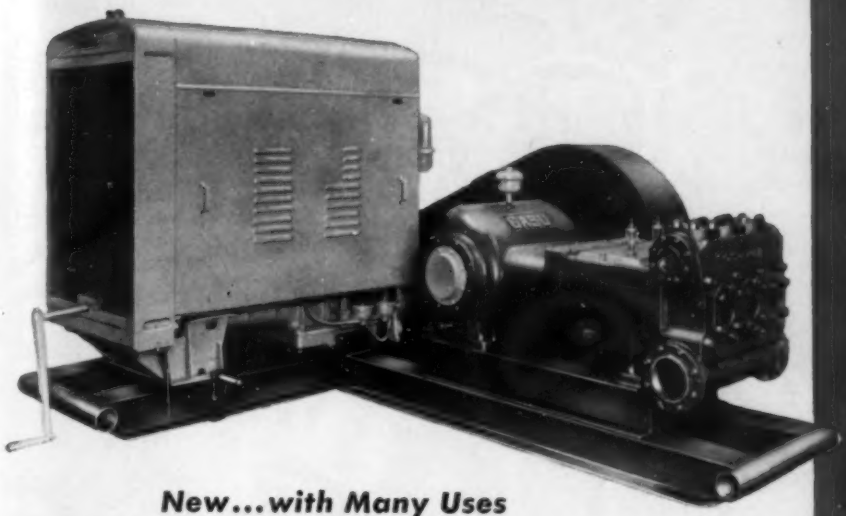
Hearings are to continue, but for the present it appears that El Paso Natural's proposed lines to carry gas from the Pacific NW line to northern California points are stalled.

## Application Filed with FPC For Texas-Florida Gas Line

Houston, Texas Gas and Oil Corporation has filed an application with the FPC for authority to construct and operate a natural gas pipe line from Baton Rouge, La., to Miami. The $110,382,000 line, proposed earlier this year (See PIPE LINE INDUSTRY, April, 1955, Page 72), would have a

# PUMPS FOR EVERY OIL INDUSTRY NEED



*New...with Many Uses*

# GASO SERIES 3600

## Type

Horizontal Triplex Plunger Pumps with 6" stroke, available with either of two fluid ends. Large capacity fluid end (Fig. 3671) takes plungers with diameters of 2½" to 3½", and operates with pressures from 1575 to 800 psi. Small fluid end (Fig. 3670) takes plunger with diameters of 1¼" to 2¼" and operates with pressures from 6250 to 1935 psi. See chart at right for displacement capacities at various speeds.

## Typical Uses

Water flooding, salt water disposal, power oil pumping, oil well acidizing, crude oil gathering systems, underground storage, cementing service, formation fracturing. Either fluid end can be supplied in the material best suited for the required service.

## Design Features

Gaso simplicity throughout, with fewer parts made extra strong to minimize operator's worries and prolong pump life. Overhaul, when required, is a simple job.

*Write today for special Bulletin on the Gaso 3600 Series*

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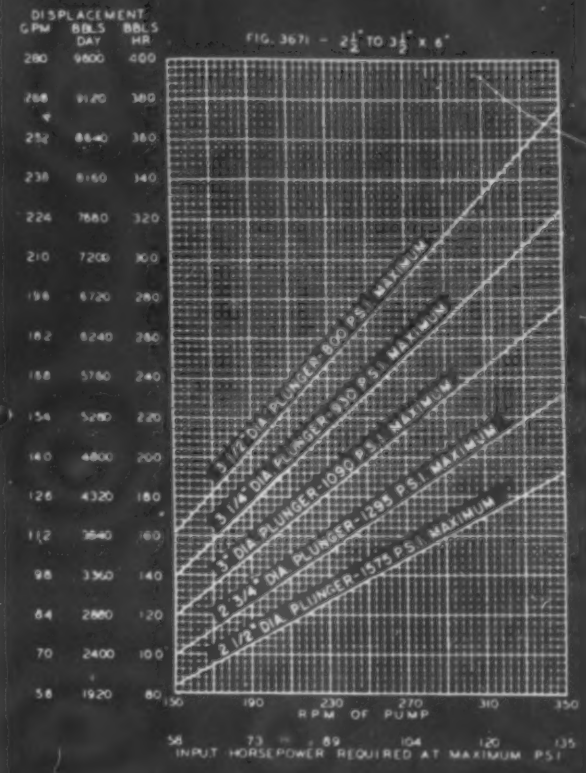


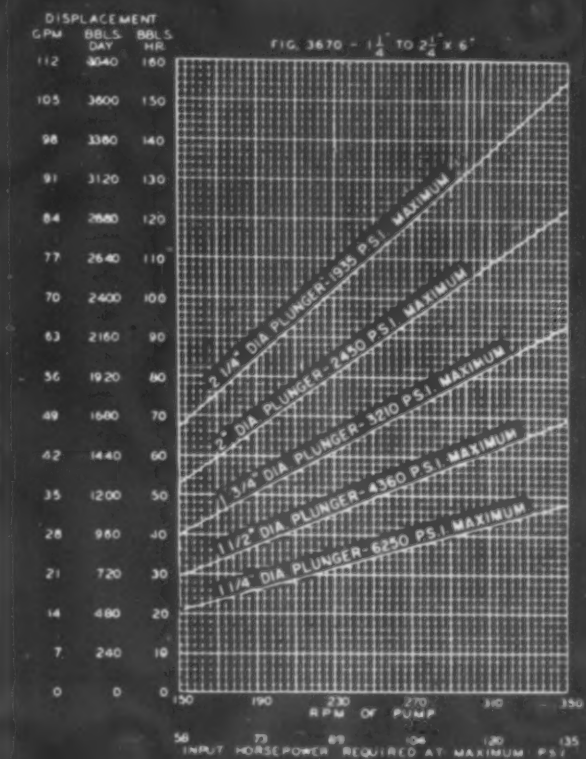


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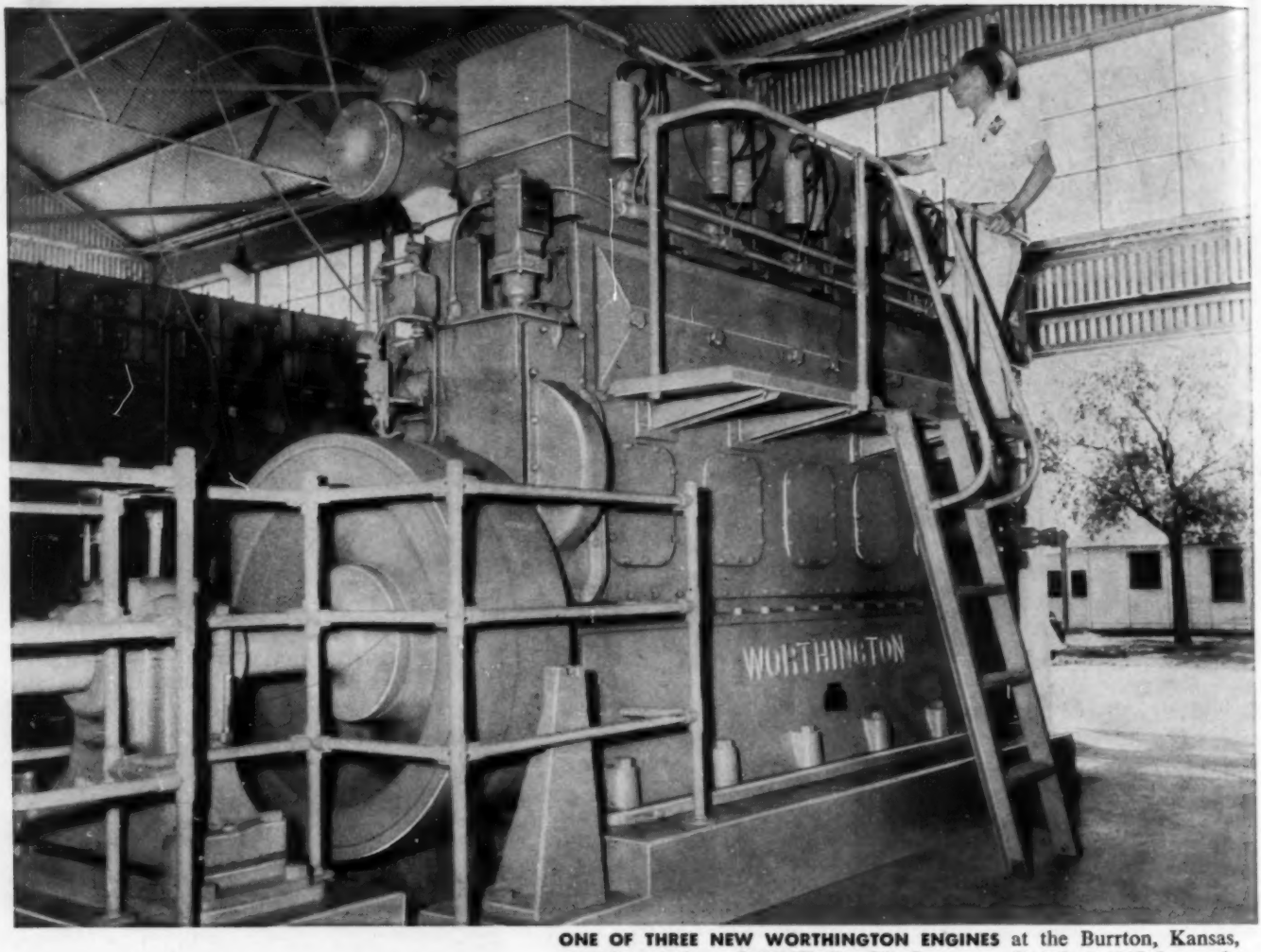
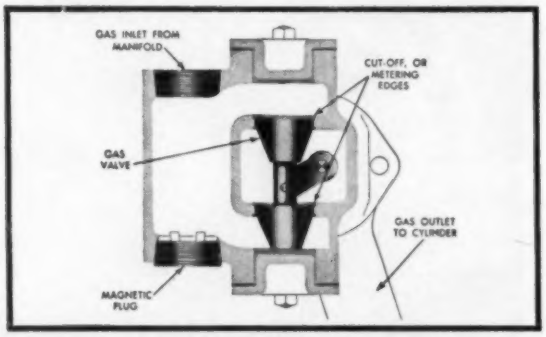



**ONE OF THREE NEW WORTHINGTON ENGINES** at the Burrton, Kansas, pumping station of the Skelly Oil Company. Rated at 445 hp each these engines drive centrifugal pumps through step-up gears.

# Skelly Oil buys three more Worthington engines




**MICRO-METERING GAS VALVES** used on all Worthington spark-ignition and dual-fuel engines assure equal cylinder loading, smooth running at all loads, better speed regulation, and lower maintenance.

You find out a lot about the performance of engines when you live with them 16 years.

Skelly Oil Company had that long to assess two Worthington gas engines installed in 1936 in their old pumping station at Burrton, Kansas. Driving centrifugal pumps through step-up gears, the Worthingtons did a fine job in moving crude oil 52 miles to the Skelly refinery in El Dorado. So when the time came to rebuild the Burrton Station with enlarged capacity, Worthington engines again received the nod from Skelly engineers.

Repeat business like this isn't exactly a surprise to Worthington. But it's still good to know that our old customers — people who have given our engines a real workout for years — keep coming back to us for additional equipment. Let us help with *your* power problems — write Worthington Corporation, Engine Division, Section E.4.6, Buffalo, New York. E.4.6

SEE the Worthington Corporation Exhibit in New York City. A lively, informative display of product developments for industry, business and the home. Park Avenue and 41st Street.

**WORTHINGTON**

***Economical, Continuous Power — Diesel, Dual-Fuel and Spark-Ignition Engines, from 200 to 5000 bhp.***

maximum capacity of 385 million cubic feet per day initially with average daily deliveries expected to run about 350 million cubic feet per day.

Stretching from a point near Baton Rouge to Cutler, Fla., just south of Miami, the main line will be made up of some 507 miles of 30-inch pipe; about 156 miles of 26-inch; 61 miles of 20-inch; 224 miles of 18-inch; and 12 miles of 12¾-inch pipe. Houston Gas also proposes 503 miles of lateral pipe lines ranging in size from 2½ inches to 18 inches to serve nearly 100 customers initially. These customers would include, in addition to public utilities serving 57 Florida cities, several industrial customers in citrus processing, mining, chemical manufacturing, cement and wood pulp operations.

Four main line compressor stations would be constructed. Two 10,600 horsepower stations to be built in Florida, a third 10,600 horsepower station in Mississippi, and another 5300 horsepower station in Florida. The line is capable of transporting 595 million cubic feet of gas daily, but at present Houston Gas is only seeking authority for an average quantity of 350 million.

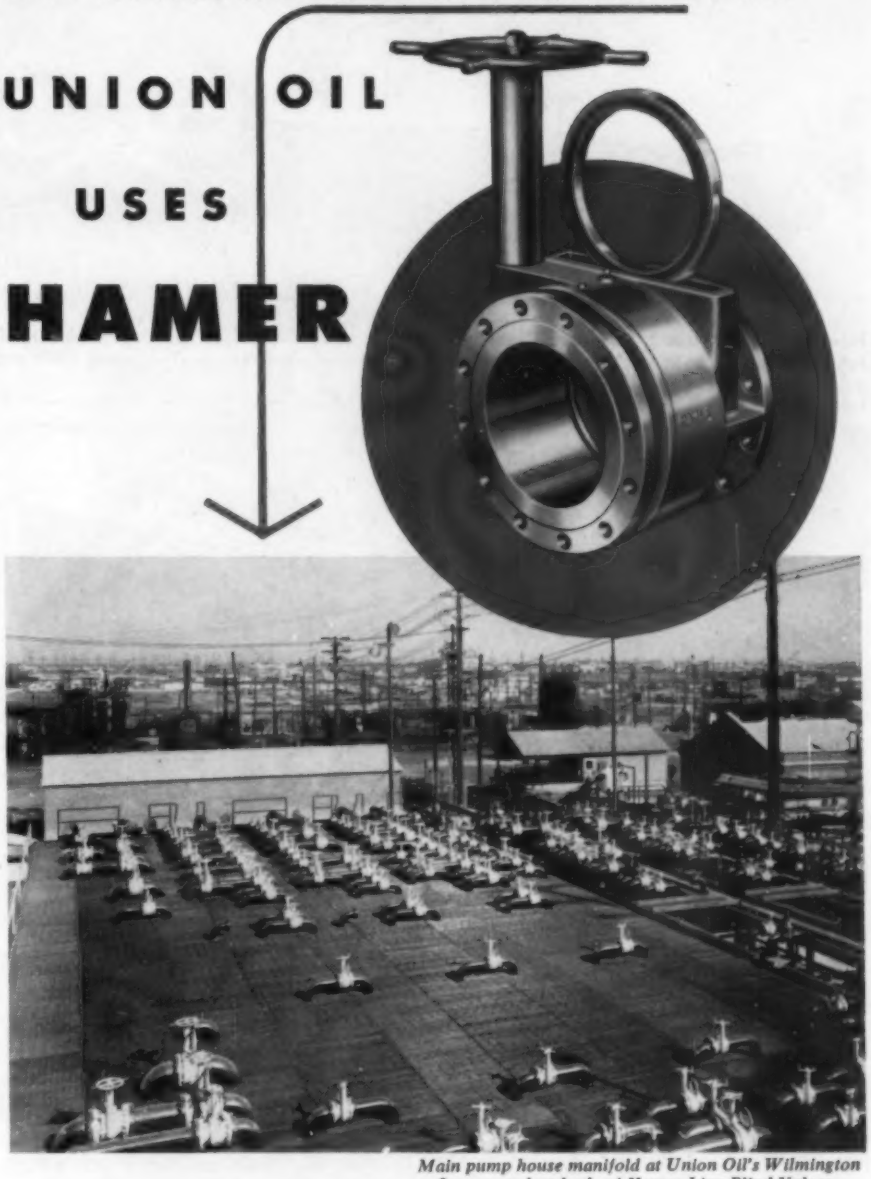
Gas would be supplied to the Baton Rouge terminus by Coastal Transmission Corporation, also of Houston, under a 20-year service agreement. The agreement would allow Houston Gas to increase its daily take to 440 million cubic feet after two years. According to Houston Gas' application, Coastal plans to file an application with FPC for authority for its line from south Texas to Baton Rouge as soon after September 1 as reasonably possible. Coastal suppliers are reported to be: Gulf Oil Corporation, Sun Oil Company; Delhi-Taylor Oil Corporation; and others.

According to earlier plans, Coastal would seek authority to build a 500-mile long gas gathering and transmission system extending from south Texas to Baton Rouge. Cost of this line would be about $70 million.

Investment firms counseling the proposed project are Blyth and Company, Inc. of New York, and Scharff and Jones, Inc. of New Orleans. Houston Gas plans call for a financing program including issuance of 20-year first mortgage bonds, interim notes convertible to preferred stock and common stock.


*To combat contamination . . .*

**UNION OIL USES HAMER**



*Main pump house manifold at Union Oil's Wilmington refinery uses hundreds of Hamer Line Blind Valves.*

**HAMER *Visible Shut-off* LINE BLIND VALVES**

**HAMER *Plug Valves***

Custom-crafted, Hamer Plugs welcome the tough applications where ordinary plug valves fall short. Standard dimensions. Readily installed.

With literally hundreds of different hydrocarbons moving through the refinery, Union Oil can't possibly risk product contamination. That's why they use Hamer Line Blinds. Hamer Line Blind Valves not only provide a permanent, positive leakproof shut-off, but are unsurpassed for long service-life and lasting safety. In addition Hamer Line Blinds are fast, simple to operate. One man can open or blind a line in one minute. Costly down time is reduced. Operational efficiency is vastly increased.

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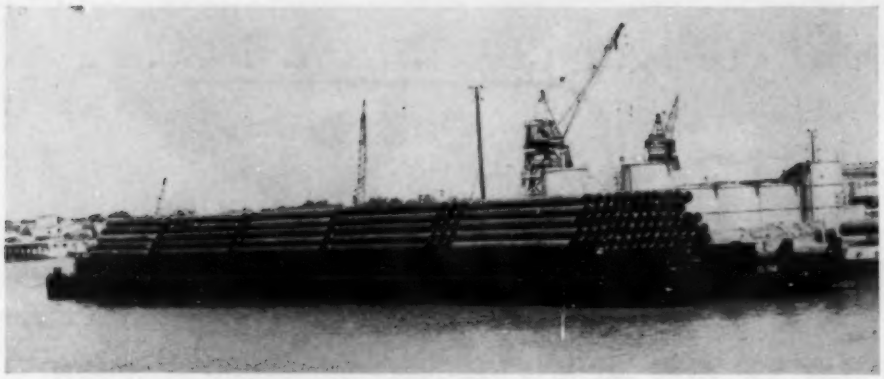
***Representatives throughout the World***




For more data on advertised products, use Readers' Service Cards, last page.



New giant barge just launched in Orange, Texas, has a 2500-ton load of 30-inch pipe ready for shipment to Tennessee Gas Transmission Corporation's right-of-way in Texas and Louisiana.

## Pipe Leaves Orange Plant For TGT's Gulf Coast Line

This barge load of 30-inch pipe is ready for shipment from Consolidated Western's Orange, Texas, mill to the right-of-way of Tennessee Gas Transmission Corporation's Agua Dulce, Texas-Kinder, La., line now underway. Over 2500 tons of pipe are aboard the giant barge, which had just been launched from the American Bridge Division plant nearby.

The open hopper barge is 280 feet long, 50 feet wide and 11 feet deep, and has a load capacity of over 2500 tons. It is the largest of this type ever built at Orange, and one of the largest ICC-regulated barges ever built on the Gulf Coast. When launching ceremonies were completed the barge was towed to the plant's dock to take on the 30-inch pipe.

Owned and operated by Coyle Lines, Inc., New Orleans, the barge's first cargoes will be large diameter pipe for the TGT line. A second barge, with similar dimensions except shorter by 80 feet, also will be used for the same service. When both barges are loaded, they are lashed together to make a rigid unit, offering minimum resistance in towing and steerage. The twin unit, 480 feet long, will then be moved down the Gulf Intracoastal Waterway with nearly 5000 tons of pipe for the Agua Dulce-Kinder line.

Coyle officials stated that when this job is done, both barges will be placed in regular service for general cargo between Carrabelle, Fla., and Brownsville, Texas, and on the Warrior-Tombigbee river waterways.

## NY State Natural Gets Temporary OK for Additions

New York State Natural Gas Corporation has received temporary authority from the FPC to replace 12 miles of 20-inch pipe with 30-inch in Tioga County, Penn. The action also included installation of an additional 2000 compressor horsepower at NY State's Boom station. Cost of the project is estimated at $1,823,000.

This authorized project is the first phase of a requested replacement of 56.5 miles of pipe line and compressor additions amounting to $7 million. Work on this line in Tioga County, and Steuben, Chemung, Schuyler, and Tompkins counties, N. Y., is planned over a four-year period.

Everything for the Pipeliner
COATING & WRAPPING MACHINES
Line Traveling Over-the Ditch or Stationary Yard and Railhead types
Machines for every job are available — for pipe from 2" to 36", for any coating and wrapping combination from single-coat, single wrap to double-coat double-wrap. Perrault's years of field experience have developed the most efficient, most dependable equipment you can find. And Perrault's earnest desire to give customer satisfaction assures you of the best service to be had. You'll do better when you call Perrault Equipment Company.
Sole Owner, W. O. DIXON
ALSO: Cleaning and priming machines — line traveling or stationary. Glass Pipe Wrap, Asbestos Felt Wrap, Kraft Wrap, and Rock Shield. Tar-Heating Kettles, Burners, Patch Pots and Accessories.
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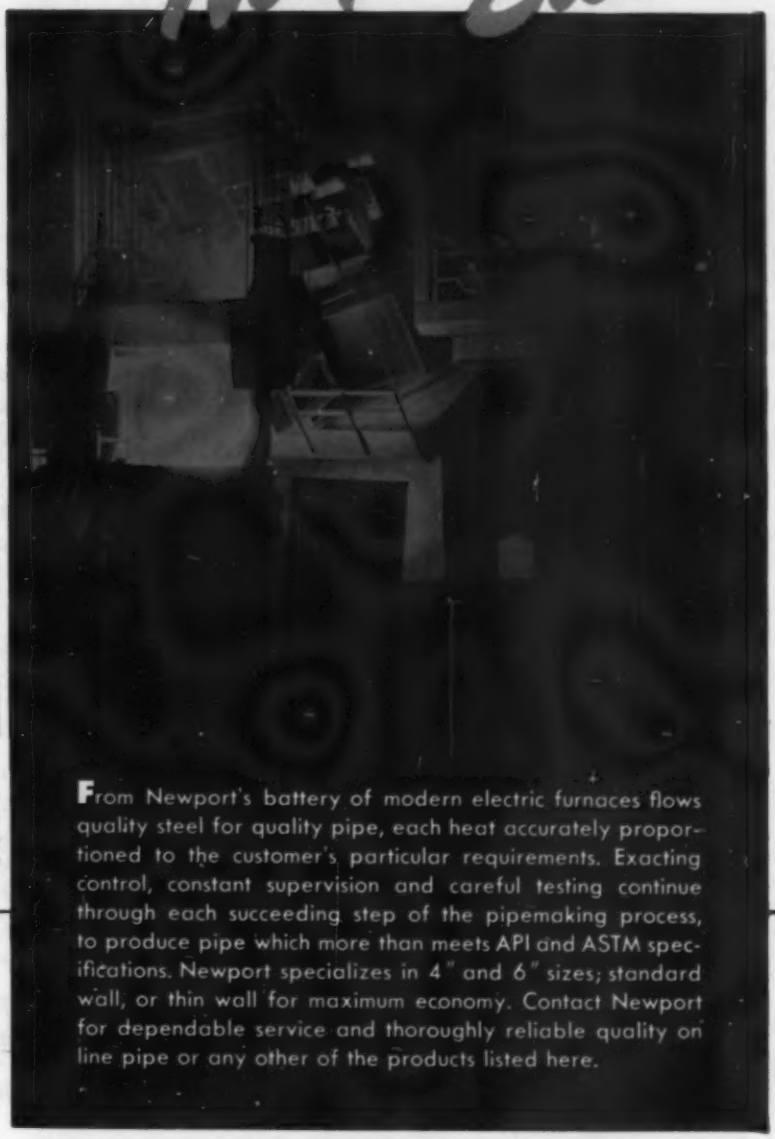
# WE'RE POURING MORE LINE PIPE* STEEL AT Newport Steel



From Newport's battery of modern electric furnaces flows quality steel for quality pipe, each heat accurately proportioned to the customer's particular requirements. Exacting control, constant supervision and careful testing continue through each succeeding step of the pipemaking process, to produce pipe which more than meets API and ASTM specifications. Newport specializes in 4" and 6" sizes; standard wall, or thin wall for maximum economy. Contact Newport for dependable service and thoroughly reliable quality on line pipe or any other of the products listed here.

***SIZES AND WEIGHTS AVAILABLE**

| O.D. | Wall | Wt. Per Ft. |
|---|---|---|
| 4½ | .125" | 5.84 |
| | .142" | 6.61 |
| | .156" | 7.25 |
| | .188" | 8.64 |
| | .219" | 10.00 |
| | .237" | 10.79 |
| 6⅝ | .134" | 9.29 |
| | .156" | 10.78 |
| | .188" | 12.89 |
| | .219" | 14.97 |
| | .250" | 17.02 |
| | .280" | 18.97 |

**ECONOMICAL WATERAIL-TRUCK DELIVERY**

Newport Steel is ideally situated on the Mississippi-Ohio River system and the great Cincinnati rail-truck hub. New barge facilities, 7 major railroads and 143 motor carriers enable Newport to give economical, dependable delivery to the entire area of the Middle West and South.

**PRODUCTS OF NEWPORT STEEL**

Cold-Rolled Sheets
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Electric Weld Line Pipe
Roofing and Siding
Eave Trough and Conductor Pipe
Culverts

Newport Steel CORPORATION
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YOUR CONFIDENCE IS JUSTIFIED WHERE THIS FLAG FLIES

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# BS&B Safety Heads

THE "CIRCUIT-BREAKER" OF PRESSURED SYSTEMS

The introduction of the BS&B Safety Head some 25 years ago presented industry with an entirely new type of precision safety device designed to protect equipment wherever overpressure was a problem.

Down through the years many special and improved models of BS&B Safety Heads and rupture discs have been developed to take care of specialized applications. Thousands upon thousands of them are "on-the-job" today guarding pressured systems in virtually every type of industry.

From our stock of thin ductile metals (which is the widest assortment in the world assembled in any one place) we can fabricate over 95% of all rupture disc orders from materials on hand.

Typical Industries Which Use BS&B Safety Heads:

Chemical Processing
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## Air Force Studies Pipe Line Network to Carry Fuel

Air Material Command officials have reported good success with an experimental pipe line system for movement of aircraft fuels in tests conducted during the last two years. Research has been underway at the Smokey Hill and McConnell Air Force Bases in Kansas and results show that fuel transportation costs have been cut by approximately $500,000 annually at these two bases.

Through these studies, the Air Force found that the pipe line systems reduced fuel handling personnel requirements by 75 percent, fuel handling time about 75 percent and records and paper work by 90 percent.

Although costs and personnel reductions are important, the Air Material Command pointed out what is even more significant, that of added security for fuel transportation. It gives an additional means of transportation in case railroads or highway routes are knocked out, and in the event of damage the lines are comparatively easy to repair. At present, the Air Force fuel shipments are largely by rail or truck. Air Material Command officials reported that the Air Force would still maintain rail and truck shipments after the proposed pipe line system is completed.

The Air Force is considering these multipurpose fuel line systems to bases throughout the U. S. Present tank farms would be connected where possible, and lines from these would carry fuels directly to bases. Plans call for fuel pipe line systems to be installed at the expense of carriers and maintained by them up to the point where they enter government storage facilities.

## Commerce Dept. Seeks Bids On Pipe for NATO Lines

Four new pipe line projects for NATO have been opened to U. S. Department of Commerce. Bids for pipe totaling approximately $15,520,570 will be taken under international competitive procedure.

Pipe is to be supplied for construction of these four lines: The second section of the Marseille-Langres line, from St. Remy to Langres, 323 miles of 12-inch pipe, estimated cost $9,142,000; Langres-Belfort, 81 miles of 8-inch pipe, $1,428,571; Le Havre-Cambrai, 155 miles of 12-inch, $4,-


For more data on advertised products, use Readers' Service Cards, last page.

235,714; and Cambrai-Anvera, 34 miles of 10-inch, $714,285. Deliveries are requested for January to June, 1956.

Applications to bid on each pipe line are to be made by October 5 to Ministere de L'Industrie et du Commerce, Service Special des Depots d'Hydrocarbures, 85 Boulevard de Montparnasse, Paris, France. Bids will be called for October 19 and all bids must be submitted by November 9.

Information about application and bidding procedures for NATO may be obtained from Any Commerce Department Office, or from the Commercial Intelligence Division, Department of Commerce, Washington 25, D. C.

## Water-Short Ontario Studies Great Lakes Line

Water-short southwestern Ontario is considering a pipe line network to carry water from Lake Huron, Lake Erie and Lake Ontario. Rapid growth in population and industry has increased water requirements in this area tremendously.

## Northern Natural Submits 1956 Plans to FPC

In an application filed with the FPC, Northern Natural Gas Company is seeking authority for a widespread construction program totalling $32 million to be built in 1956.

Major projects will be extensions from the Minneapolis-St. Paul area to Duluth, Minn., and Superior, Wis.; another from Sioux Falls, S. D., to Aberdeen, S. D.; and a third from Rochester to Winona, Minn. The Twin City-Duluth-Superior line will consist of 168 miles of 20-inch. Northern will lay 92 miles of 12-inch and 71 miles of 10-inch in South Dakota and add 307 miles of branch lines to complete these extensions.

Shorter lines will include 15 miles of 24-inch added to Northern's main line in Nebraska and approximately 28 miles of 24-inch pipe from Ogden, Iowa, to an underground storage near Redfield, Iowa. An addition of 12,640 horsepower to compressor stations in Texas, Kansas, Nebraska and Iowa rounds out the scheduled program.

Northern's current application supplements an earlier one proposing the Duluth and Aberdeen extensions be built this year for a service using gas from Canada. Delay on the financing of Trans-Canada Pipelines, Ltd. project this year led to the postponement.

*Super bending quality and workability speeds construction . . .*

**Lone Star API Line Pipe**

There's real economy and extra speed in construction when you use Lone Star pipe. Lone Star's convenient pipe inventories, the direct haul of the pipe from the mill, the stringing of the pipe along the right-of-way without rehandling, superior bending quality . . all these facts contribute to the sweeping trend to Lone Star.

Lone Star's vast, completely integrated steel plant was especially built for and dedicated to serving the dynamic oil and gas industries. Lone Star meets API specifications.

Neighbor, wherever you are, specify Lone Star . . and we both get a good deal!

Lone Star STEEL COMPANY

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For more data on advertised products, use Readers' Service Cards, last page.

John Merriam, president of Northern Natural, expressed doubt that a Canadian gas supply will be imported until early 1957 at the earliest. Gas for the proposed program will come from present sources of supply in the Southwest plus a normal addition of suppliers.

A proposed underground storage field near Redfield, Iowa, will add about 50 million cubic feet per day to Northern's daily capacity during the 1956-57 heating season. The 1956 building program would increase daily capacity of Northern's system by 93 million cubic feet.

## Texas Eastern to Take Mexican Gas

Contract negotiations are now complete between Petroleos Mexicanos (Pemex) and Texas Eastern Transmission Corporation to bring 100 million cubic feet per day of Mexican gas into the U. S. for interstate transmission. This initial quantity may be increased, under certain conditions of the 20-year contract, to deliver an additional 100 million cubic feet per day as more reserves are discovered by Pemex, stated George T. Naff, president of Texas Eastern.

Pemex will receive an annual income of approximately $5 million from the contracted sale. The contract has been approved by the Mexican Secretary of Economy.

Texas Eastern must make a timely application with the FPC for facilities necessary to receive the gas at the Rio Grande near Reynosa. Naff reported that Texas Eastern "proposes to file the application relating to this contract at the earliest possible date."

### TGT Gets FPC Approval For Loops, Gathering Lines

The FPC has approved Tennessee Gas Transmission Company's application requesting authority for construction of 221 miles of main line loops in Kentucky and Ohio and about 376 miles of gathering lines. Proposed new line plus the addition of 12,540 compressor horsepower will cost an estimated $56 million.

Included in the project are 74 miles of 30-inch loop along TGT's main line in Kentucky and 147 miles of 26-inch loop in Ohio. Gathering lines ranging in size from 6-inch to 24-inch will extend 376 miles to reach gas suppliers in south Louisiana and in the lower Mississippi Delta area.

Two new compressor stations are authorized, each rated at 4400 horsepower. One will be built at New Albany, Miss., and another near Extension, La. Horsepower will be increased by 2640 at the Kinder, La., station; 1100 additional horsepower is approved for a previously authorized station at Kindley Lake, N. Y.

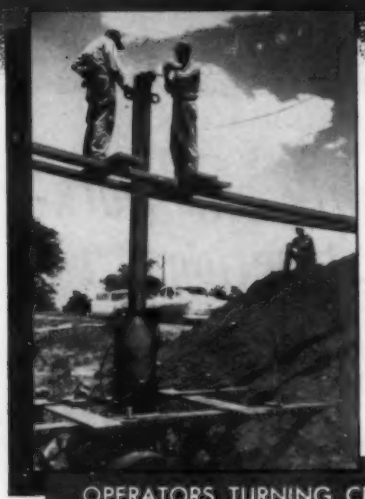
Authorized additions will increase TGT's average daily capacity from 1,694,500 Mcf per day to 1,800,000 Mcf per day. Peak day capacity will be increased from the present 2,074,500 Mcf per day to 2,180,000 Mcf.

### Cosden to Build 100-Mile West Texas Products Line

Cosden Petroleum Corporation has completed preliminary plans for building and operating a 100-mile 6-inch products pipe line from its Big Spring, Texas, refinery to a products terminal at Abilene, Texas.

Cost of the project, including expanded terminal facilities at Abilene,


16" and 20" HIGH-PRESSURE GAS LINES MODIFIED in service



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OF PITTSBURGH, *CONTINUED GAS SERVICE* TO SEVERAL THOUSAND CUSTOMERS IN THE VICINITY OF WHEELING, WEST VA. WHILE INSTALLING A NEW PRESSURE REDUCING STATION ON THEIR 16" GAS TRANSMISSION LINE

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will be approximately $1.5 million. It will provide for transportation of ten different grades of gasoline, jet fuel and two grades of distillate. Plans call for 150,000 barrels of storage at the Abilene terminal; this to be made up largely of 10,000 barrel tanks.

The line will be a common carrier and owned by a subsidiary of Cosden Petroleum Corporation.

Pipe Line Technologists of Houston have been retained to do the design engineering, obtain right-of-way and handle purchasing and expediting.

## Shell Sets Up New Division To Operate Butte Pipe Line

Shell Pipe Line Corporation will establish a new operating division early this month with headquarters at Casper, Wyo. The new office will be designated the Rocky Mountain division.

From Casper, the division will operate the Butte Pipe Line Company crude line now nearing completion in eastern Montana and Wyoming, and manage Shell's wholly owned facilities in northeastern Colorado.

The Butte line extends from Poplar, Mont., to Fort Laramie and Guernsey, Wyo. It is jointly owned by Shell Oil Company, Murphy Corporation, Placid Oil Company and Northwestern Improvement Company, a subsidiary of Northern Pacific Railroad.

## FPC Issues Latest Map Of Major Gas Pipe Lines

The FPC has issued a June 30, 1955, revision of its map of "Major Natural Gas Pipe Lines" in the U. S.

The map is approximately 14 by 20 inches, with a scale of 170 miles per inch. It is printed in five colors and shows major existing pipe lines, those under construction, those authorized but not yet started and proposed lines.

Each line is numbered and keyed to an index of operating companies listed at the bottom of the map. Existing or proposed pipe line systems of 115 companies are represented. In addition, the map shows location of natural gas fields, indicating both major sources and generalized areas of supply.

Copies may be purchased from the Federal Power Commission, Washington 25, D. C., at 25 cents each. Order by number FPC M-44.


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## Pipe Line Contracts Not Let

| COMPANY | Length in Miles | Diameter | Type | Origin and Terminus | Estimated Cost | Status |
|---|---|---|---|---|---|---|
| Alabama-Tennessee Natural Gas Co.—Florence, Ala. | 25 | 8, 12 | Gas | Colbert County, Ala. loop. | $808,450 | Authorized |
| American Gilsonite Co. | 80 | | Gilsonite Slurry | Bonanza, Utah—Western Colorado, refinery | ..... | Planned |
| American Pipe Line Corp.—New York City (Swinerton & Walberg, Engineering) | 1,425 plus 485 miles feeders & distribution lines | 24, 26 | Products | Beaumont, Texas area—Newark, N.J. | $170 million | Approved ODM |
| Arkansas-Louisiana Gas Co. | 66 | 24 | Gas | Arkansas, Louisiana and Texas loops | $9,245,166 | Authorized |
| Ar-Mex Pipe Line Co. | 900 | 8, 12, 14 | Crude | Guernsey, Wyo.—Phoenix, Ariz. | $31 million | Planned |
| H. W. Bass & Sons, Inc. | 152 | 4, 6 | LPG | Live Oak County, Texas—Corpus Christi, Texas | ..... | Planned |
| Bell Oil and Gas Co. | 140 | 6-8 | Products | Ardmore—Cushing, Okla. | ..... | Planned |
| Big Horn Pipe Line Co.—Cheyenne, Wyo. | 150 | 8 | Crude | Ash Creek, Wyo. field—Midwest, Wyo. | ..... | Planned |
| California-Oregon Pipe Line System | 103 | 6 | Crude | Crescent City, Calif.—Medford, Ore. | $2 million | Planned |
| Carolina Natural Gas Corp.—701 Wilder Bldg., Charlotte, N.C. | 185 | 2, 12 | Gas | North and South Carolina | ..... | Proposed |
| Central Hudson Gas & Electric Co. | 48 | 12 | Gas | Albany—Kingston, N.Y. | ..... | Applied to FPC |
| Cities Service Gas Co.—1st National Bank Bldg., Oklahoma City, Okla. | 39 | 20, 26 | Gas | To replace lines in Kansas and Missouri | $1,860,000 | Authorized |
| | 13 | .... | Gas | Lafayette County, Kansas | $285,000 | Authorized |
| | 15.5 | 16 | Gas | Carter County—Garvin County, Okla. | $541,050 | Authorized |
| Clinchfield Coal Corp.—Dante, Va. | 16 | 12 | Gas | Dickenson County, Va.—Osborne Gap, Ky. | $785,000 | Authorized |
| Coastal Transmission Corp.—Houston, Texas | 500 | 30 | Gas | McAllen, Texas—Louisiana connection, Houston, Texas Gas. | $70 million | Considered |
| Coast Counties Gas & Electric Co.—369 Pine St., San Francisco | 40 | 3, 4, 8 | Gas | Coast and Valley region, Calif. | ..... | Planned |
| Colorado Interstate Gas Co. | 115 | 4, 6, 8 | Gas | Denver—Julesburg Basin—Basin Cities | ..... | Before FPC |
| | 328 | 16, 18 | Gas | LaPlata County—Pueblo, Colorado Springs and Denver | $21,600,000 | Authorized |
| Compania del Oleoducto Buenaventura—Cali, Colombia, S.A. | 90 | .... | Products | Buenaventura—Cali, Colombia, S.A. | $4 million | Planned |
| Consolidated Gathering Systems, Ltd. | 198 | .... | Crude | Sturgeon Field—Edmonton. | ..... | Planned |
| Consolidated Natural Gas Corp.—New York | 112 | .... | Gas | In Ohio—Plus other smaller lines | $6 million | Planned |
| Cosden Petroleum Corp.—Big Spring, Texas | 100 | 6 | Products | Big Spring—Abilene, Texas | $1.5 million | Proposed |
| Deep Rock Gas Co. | 120 | 6 | LPG | Tioga, N.D.—Canadian border | ..... | Planned |
| Dixie Pipe Line Co. | 20 | 8 | Gas | Gwinville Field, Miss.—Transcontinental Gas line | $425,000 | Authorized |
| El Paso Natural Gas Co.—El Paso, Tex. | 32.5 | 10 | Gas | Reagan and Upton counties, Texas | $799,000 | Authorized |
| | 500 | 34 | Gas | Parallel from San Juan Basin to Topock, Ariz. | ..... | Proposed FPC |
| | 31.9 | 8 | Gas | Pinal County, Ariz. Service Line. | ..... | Before FPC |
| | 119 | 3-6 | LPG | Bloomington—Gallup, N.M. | ..... | Planned |
| | 62 | 14 | Gas | Coke County—Midland County, Texas | $2.2 million | Authorized |
| Empresa Nacional del Petroleo | 80 | 6 | Products | Concon—Santiago, Chile | ..... | Planned |
| Freedom-Valvoline Oil Co. | 34 | 8 | Products | Harpster—Findlay, Ohio | $700,500 | Planned |
| Governments of Southern Rhodesia and Portuguese South Africa | 200 | .... | Products | Beria, Portuguese Mozambique—Umtalia, Southern Rhodesia | ..... | Considered |
| Hope Natural Gas Co.—445 W. Main St., Clarksburg, W. Va. | 33 | 8, 10, 12 | Gas | Wyoming County, W. Va.—Buchanan County, Va. | ..... | Proposed |
| Houston Texas Gas & Oil Co.—4604 Main St., Houston | 961 | 12-30 | Gas | Baton Rouge, La.—Miami, Fla. | $110 million | Before FPC |
| Idaho Natural Gas Co.—Goodland, Kansas | .... | .... | Gas | Pacific Northwest line—points in Southern Idaho | ..... | Proposed |
| International Pipe Line Co., Inc.—227 N. Colfax Ave., Minneapolis, Minn. | 132 | 8 | Products | Wrenshall, Minn.—Minneapolis Bulk Terminal | $4,250,000 | Planned |
| Iraq Petroleum Co. | 75 | 24 | Crude | Homs, Syria to Tripoli, Lebanon | ..... | Proposed |
| Lateral Gas Pipe Line Co.—Cedar Rapids, Iowa | 27 | 4 | Gas | Grant—Clarinda, Iowa | $267,000 | Proposed |
| Lone Star Gas Co.—Dallas | 230 | 22, 26 | Gas | Cotton County, Okla.—Fritch, Texas | $18.7 million | Before FPC |
| | 205 | .... | Gas | Snyder, Texas to tie in with Cotton County, Okla.—Fritch, Texas line | ..... | Before FPC |
| Malco Pipe Line, Inc. | 91 | 6 | Products | Prewitt, N.M.—Albuquerque | $1,250,000 | Planned |
| Manufacturers, Gas, Light, and Heat Co. | 72 | 16-20 | Gas | Doddridge, Wetzel, and Marshall Counties, W. Va. | ..... | Planned |
| | 213 | 3-26 | Gas | Various locations in Pa., W. Va., and Ohio | ..... | Planned |
| | 40 | .... | Gas | Allegheny, Washington, and Beaver Counties, Pa. | ..... | Planned |
| Mayflower Pipe Line Co.-(Pine Tree Natural Gas Co.)—70 Pine St., New York, N.Y. | 200 | 10 | Products | New Jersey refining area—New England | ..... | Planned |
| Michi, Inc. | 222 | 10 | Crude | Highland, Ind.—Alma, Mich. | ..... | Planned |
| Michigan-Wisconsin Pipe Line Co.—500 Griswold, Detroit | 252 | 4-24 | Gas | Various locations in Illinois and Wisconsin | $11 million | Proposed |
| Mississippi River Fuel Corp. | 190 | 10-18 | Gas | Laterals in Woodlawn and Waskom Gas Fields, Texas | ..... | Planned |
| Missouri Central Gas Co. | 25 | 6 | Gas | Moberly—Macon, Mo. | ..... | Proposed |
| Missouri Public Service Co.—Warrensburg, Mo. | 136.4 | 8-10 | Gas | New Franklin, Mo.—Grundy County, plus laterals | $5 million | Proposed |
| Montana-Dakota Utilities Co.—Minneapolis | 56 | 2, 4, 6 | Gas | Hettinger and Stark counties, N.D. | $728,854 | Authorized |
| | 44 | .... | Gas | Various locations in S.D. and Wyoming | $1,414,200 | Authorized |
| Moore-Stoner Co. | 200 | 6 | Products | Glendive, Mont.—Minot, N.D. | $2.5 million | Planned |
| NATO | 1920 | 4-10 | Products | To serve military bases in Western Europe | ..... | Foster-Wheeler Prime Contractors, 425 miles let |
| Natural Gas Pipe Line Co. of America—20 N. Wacker Dr., Chicago | 350 | 20, 26 | Gas | Wise County, Texas—Fritch, Texas | $28.5 million | Before FPC |
| Natural Gas Producers, Inc.—Colorado Springs | 61.8 | 12 | Gas | Yenter Pool—Denver | $1,374,000 | Planned |
| | 49 | 10 | Gas | Denver-Julesburg Basin—Fort Morgan, Brush and Denver | ..... | Planned |
| Nebraska Pipe Line Co. | 220 | 6 | Products | Cheyenne, Wyo.—North Platte, Neb. | $4 million | ODM certificate granted |
| Nevada Natural Gas Co. | 114 | 12, 16 | Gas | Various loops along Needles, Calif.-Las Vegas, Nev. line | $2.5 million | Planned |
| New River Gas Co. | 50 | .... | Gas | Summers-Monroe Counties, W. Va. and Narrows and Dublin, W. Va. | ..... | Planned |
| New York State Natural Gas Corp. | 56.5 | 30 | Gas | Tioga County, Pa. | $7 million | Before FPC, 12 miles Authorized |
| NNCW Pipe Line Co.—Dallas, Texas | 127 | 8, 10 | Crude | Clareton Field—Casper, Wyo. | $3.6 million | Planned |
| Northern Natural Gas Co.—2223 Dodge St., Omaha | 167 | 24 | Gas | Farmington, Minn. to Duluth, Minn. and Superior, Wis. | $12 million | Before FPC |
| | .... | .... | Gas | To interconnect with Natural Gas Pipe Line | $244,000 | Planned |
| | 28.4 | 30 | Gas | Test lines to underground storage near Redfield, Iowa | $4.8 million | Before FPC |
| | 15 | 24 | Gas | To main line in Nebraska | ..... | Before FPC |
| | 163 | 10, 12 | Gas | Various locations in South Dakota, plus 307 miles of branch lines | ..... | Before FPC |
| | 6 | 6 | Gas | Iowa loop and compressor additions in Texas | $760,000 | Before FPC |
| Northwestern Utilities, Ltd.—10124-104th St., Edmonton, Alberta, Canada | 42 | 12 | Gas | Bonnie Glen—Edmonton, Alberta | $1.4 million | Proposed |
| Ohio Fuel Gas Co. | 18.9 | 16 | Gas | Hardin and Allen Counties, Ohio | $792,400 | Authorized |
| Pacific Gas & Electric Co. | 190 | 34 | Gas | Various loops, between Topock, Ariz.—Milpitas, Calif. | $4 million | Proposed |
| Pacific Northwest Pipe Line Corp.—M & M Bldg., Houston | 1466 plus 443 | 22, 26 | Gas | San Juan Basin—Pacific Northwestern states | $163 million | Contracts let for 1221 miles |
| Pawnee Pipe Line Co. | 15 | 8 | Crude | Northeast Colorado Sector—Denver-Julesburg, Basin | ..... | Planned |
| Permian Basin Pipe Line Co. | 11 | 6 | Gas | Lea County, N.M. | ..... | Before FPC |
| Petroargentina | 370 | 16 | Crude | Newguen—Bahia Blanca, Argentina | $40 million | Planned |
| Petroleos Mexicanos—Ave. Juares, 94, Mexico City | 440 | 20 | Gas | Brazil—Tampico—Poza Rica, Mexico | ..... | Planned |
| | 260 | 6, 8 | Products | Lagos, Mexico—Guadalajara, Aguascalientes and Salamanca | ..... | Planned |
| | 145 | 12 | Crude | 18 de Marzo Field—Monterrey, Mexico | ..... | Considered |
| Phillips Petroleum Co.—Bartlesville | 54 | 6 | Products | Goldsmith—Borger, Texas | ..... | Planned |
| | 50 | .... | Ethylene | Sweeny—Pasadena, Texas | ..... | Planned |
| Pittsburgh Consolidation Coal Co.—Pittsburgh | 108 | 10 | Coal | Georgetown—Eastlake, Ohio | ..... | Eng. Underway |
| S. & M. Pipe Line Co., Ltd. | 100 | 8, 10 | Crude | Midale, Forbisher, Steelman, Lampman, Alida, and Nottingham, Sask. to Crome, Manitoba | ..... | Proposed |

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(Above) Williams Brothers, well-known cross-country pipeliners, take advantage of the speed and mobility of a rubber-tired Lorain Moto-Crane to unload pipe from a barge, and then move to the right-of-way for pipe stringing.

(Below) Two Lorain "TL" Hoes, on extra-wide crawlers, easily straddle this trench to rip through hard shale and rock on this tough digging job in the Southwest.

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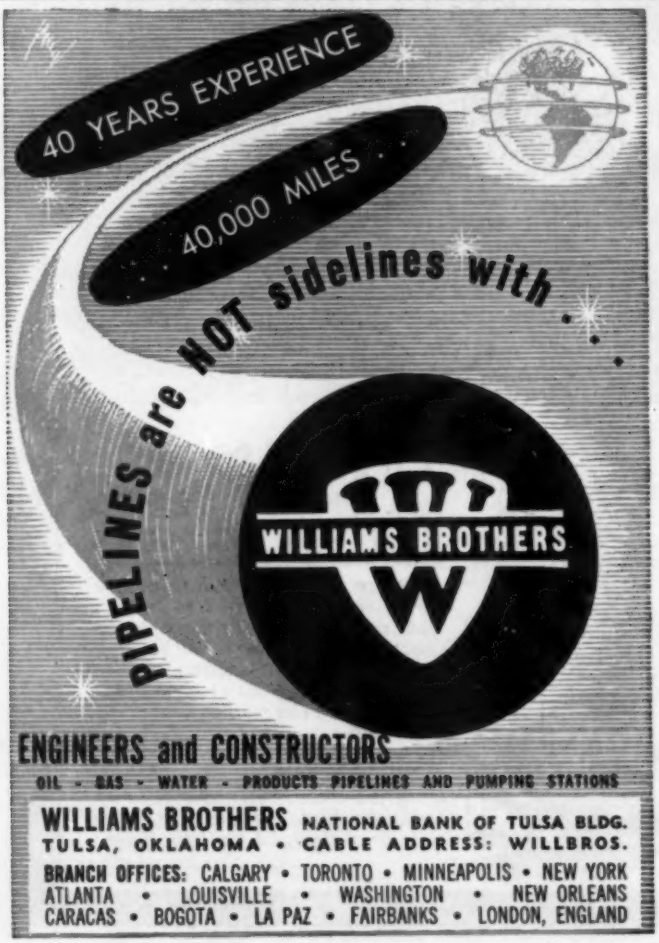
For more data on advertised products, use Readers' Service Cards, last page.

## Pipe Line Contracts Not Let—(Continued)

| COMPANY | Length in Miles | Diameter | Type | Origin and Terminus | Estimated Cost | Status |
|---|---|---|---|---|---|---|
| Salt Lake Pipe Line Co. | .... | .... | Products | El Paso, Texas—Albuquerque, N.M. | $4 million | Planned |
| | 82 | 10 | Crude | Loop on Rangely—Salt Lake City line | ..... | Planned |
| Santos Jundiai Railway Co.—Brazil | .... | 8, 14, 22 | Crude & Products | Expansion of Santos—Sao Paulo system | $5 million | Planned |
| Shamrock Pipe Line Corp. | 100 | 6 | Products | Amarillo—Abernathy, Texas | ..... | Planned |
| South Alberta Pipe Line, Ltd. | 150 | 8 | Gas | Etzikom Field—Medicine Hat, Alberta | $1 million | Proposed |
| Southern Calif. Gas Co. and Southern Counties Gas Co. | 278 | 30 | Gas | Topock, Ariz.—Los Angeles | $31 million | Planned |
| Southern Natural Gas Company | 39 | .... | Gas | Various locations in Ga. and La. | $2.2 million | Authorized |
| Standard Pipe Line Co. | 350 | 16 | Crude | Glendive, Mont.—Guernsey, Wyo. | ..... | Before ODM |
| | 330 | 16 | Crude | Wink, Texas—Albuquerque, N.M. | ..... | Before ODM |
| Stanmount Pipe Line Co. | 140 | 10 | Crude | Cayiga and Beaver Lake Fields, N.D. to connect with Interprovincial Pipe Line | ..... | Planned |
| Sturgeon Pipe Line, Ltd. | 100 | 12 | ..... | Sturgeon Lake Field—Trans-Mountain system | $6,500,000 | Planned |
| Sunflower Pipe Line Co.—Tulsa, Okla. | 265 | 3-6 | LPG | Kearny, Grant and Haskel Counties, Kansas—Wichita, Kansas | $3.5 million | Authorized |
| Tennessee Gas Transmission Co.—Box 2511, Houston | 220 | 26, 30 | Gas | Loops in Kentucky and Ohio plus 376 miles of Supply laterals in Texas and Louisiana | $56 million | Authorized |
| | 1,050 | .... | Gas | Border near Emerson, Manitoba—Nashville, Tenn. | ..... | Proposed |
| Texas Eastern Transmission Corp. and Texas Eastern, Penn-Jersey Corp. | 11 | .... | Gas | Loops in Philadelphia area plus compressor facilities | $2.4 million | Authorized |
| Texas Gas Transmission Corp. | 198 | 20 | Gas | East Lake Palourde, La.—main trans. line | $20 million | Before FPC |
| Texas—Ohio Gas Co. | .... | 10 | Gas | Connection with Transco line to Carolina and Georgia points | ..... | Considered |
| | .... | .... | Gas | Houston, Texas—Miami, Fla. | ..... | Considered |
| Trans-Canada Pipe Line, Ltd.—Calgary, Alberta | 2240 | 30, 36 | Gas | Alberta—Eastern Canada | $297 million | Planned |
| Transcontinental Gas Pipe Line Corp.—3100 Travis St., Houston | .... | .... | Gas | Connecting facilities with Texas Eastern Penn-Jersey in Pennsylvania and New Jersey | $131,628 | Authorized |
| | 24.2 | .... | Gas | Gathering Lines from South Bayou Mallet, Maxie and Happytown Fields, La. | $754,000 | Authorized |
| | 27 | .... | Gas | Loops in La., Ga., N.C., Va., and Md. | $3,426,000 | Authorized |
| Trans-Prairie Pipelines, Ltd. | 24.5 | 3, 4, 6 | Crude | Gathering lines in Midale, Forbisher and Alida oil fields, Canada | ..... | Proposed |
| Triangle Pipe Line Co. | 560 | 12 | Products | Arkansas City, Ark.—Covington, Ky. | $24.5 million | Proposed |
| Trunkline Gas Co. | 24 | .... | Gas | Eight new compressor stations and loops | $18.7 million | Authorized |
| Union Gas Co. of Canada, Ltd.—Chatham, Ontario | 180 | 24 | Gas | Dawn Gas Field to Lamberton County to deliver gas to Dominion Gas Co. | ..... | Planned |
| Union Oil Co. of Calif. | 815 | .... | Shale oil Products | Rifle, Colo.—Los Angeles | $56 million | Planned |
| United Gas Pipe Line Co. | 63 | 16, 20 | Gas | Various locations in Miss., Ala. and Florida | $8.3 million | Authorized |
| United Natural Gas Co. | 50 | 12 | Gas | Elk County—Jefferson County, Pa. | ..... | Planned |
| U. S. Dept. of Defense | 97 | .... | Crude | Elk Hills Naval Reserve—Los Angeles | $8 million | Considered |
| U. S. Navy | 450 | 8 | Gas | Gubik Field—Fairbanks, Alaska | $20 million | Planned |
| Utah Natural Gas Co. | 40 | 16 | Gas | Orem—Salt Lake City, Utah | ..... | Planned |
| Virginia Natural Gas Co. | 153 | ... | Gas | Buckingham—Richmond and Portsmouth, Va. | ..... | Planned |
| Warren Petroleum Co. | 54 | 4-30 | Gas | Lea County, N.M. | ..... | Planned |
| Washington Gas Light Co.—Washington, D.C. | 11 | 24 | Gas | Chillum Station—Gordon's Corner, Md. | $2 million | Authorized |
| West Coast Pipe Line Co.—Mercantile Bank Bldg., Dallas | 960 | 24, 26 | Crude | Wink, Texas—Norwalk, Calif. | $106 million | Planned |
| Westcoast Transmission Company, Ltd. | 650 | 30 | Gas | Peace River Fields—Sumas, Wash. Connecting with Pacific Northwest Pipeline—Second Line | $140 million | Planned |
| Winnipeg and Central Gas Co. | 450 | 4-8 | LPG | Tioga, N.D.—Winnipeg, Canada | $20 million | Planned |
| Wyoming Gas Products Corp. | .... | .... | Gas | Gathering system in Weston County, Wyo. to feed gasoline plant | ..... | Planned |
| Yacimientos Petroliferos Fiscales Bolivianos | 170 | 4 | Crude | Bermejo—Tupinza, Bolivia | ..... | Planned |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For more data on advertised products, use Readers' Service Cards, last page.

# How to do it

# PIPE LINE HINTS

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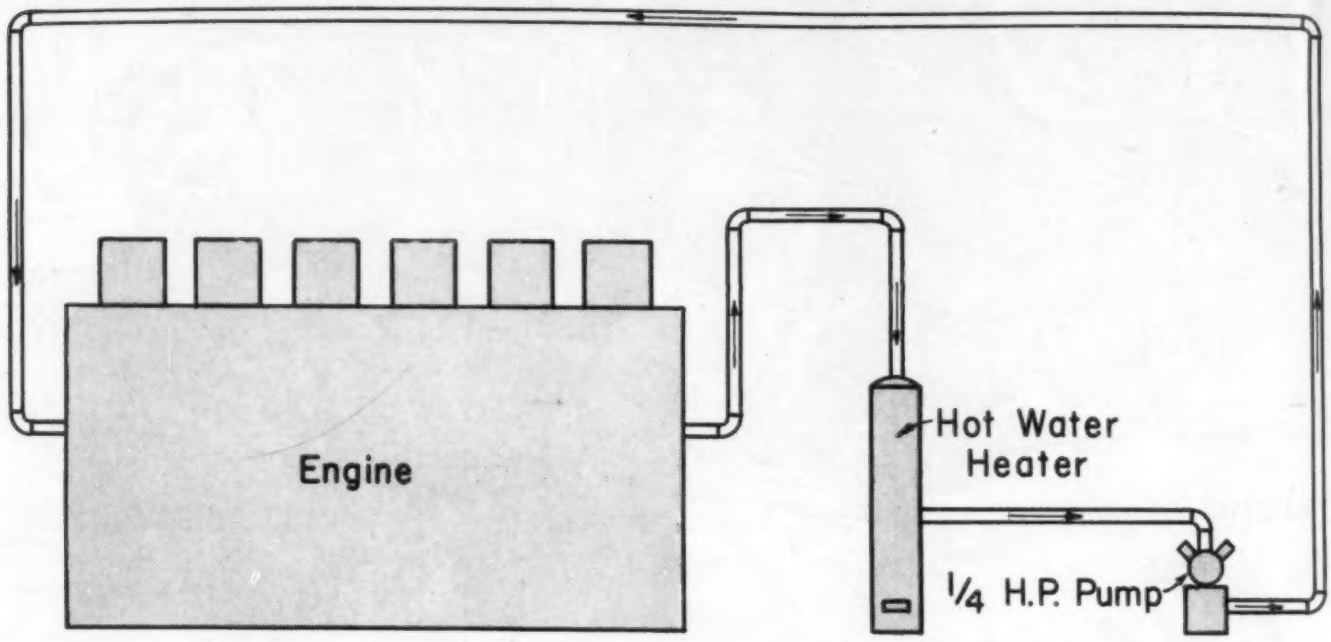



## Water Heater Keeps Engines Warm for Winter Starts

At stations where engines are often shut down and started during cold weather, installation of a hot water heater and circulating pump can improve engine operation.

The heater and pump are piped into the cooling system as shown. Suction may be taken on one or more engines as needed. This system has been used to keep dual fueled diesel engines warm at a pump station. The results—reduced start up time, improved operation, less condensation in engine when down and probable reduction of repair time and expenses.

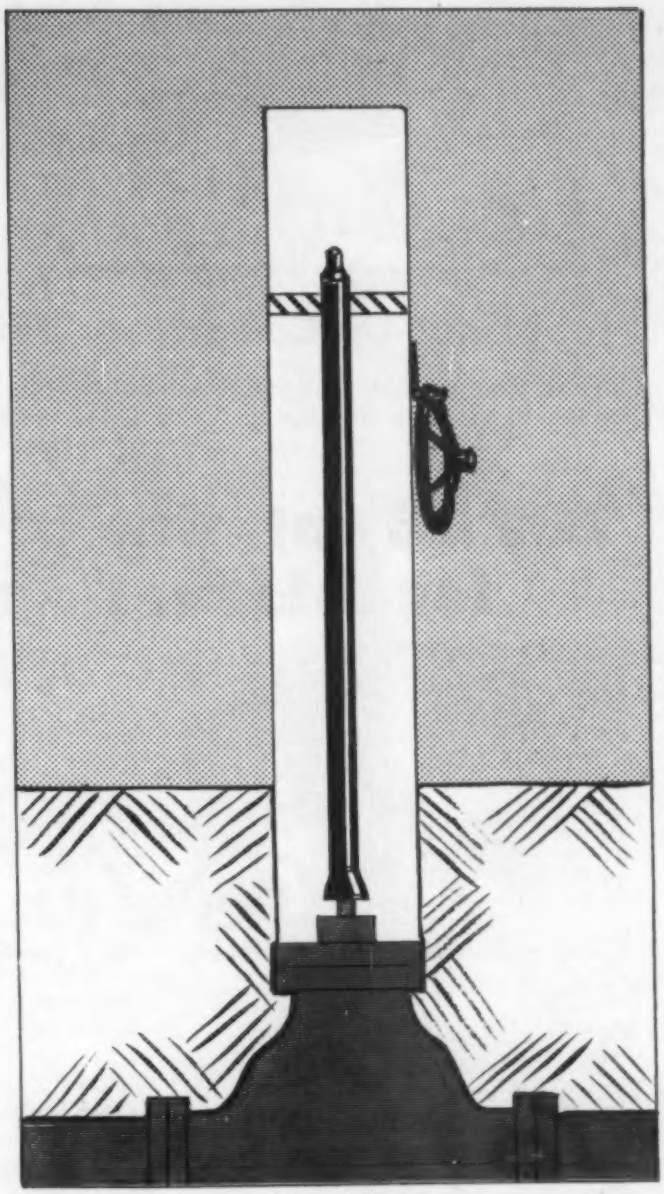
## Make Pipe Rack for Pick-up Truck

The pipe rack shown here can be used for hauling small diameter pipe; yet at the same time it can be used as frame work for a tarpaulin when needed as a crew truck. The framework is of one-inch pipe with the exception of the peaked roof, which is of ¾-inch pipe.

## Extend Stand Pipe Valve Stem For Waist High Operation

Here is a simple means of converting frequently operated valves to waist high operation. To extend the valve stem, first braze together two nuts sized to fit the gate valve stem and weld them to a rod of proper length. Grind a square on the top of the rod to fit the gate wheel. Then screw the extension on tightly and grease the gland so the stem turns smoothly.

A standpipe is made to fit over the top of the valve as shown. The gate wheel hangs on the standpipe so that it is readily accessible and the cap is locked on when the valve is not operated.

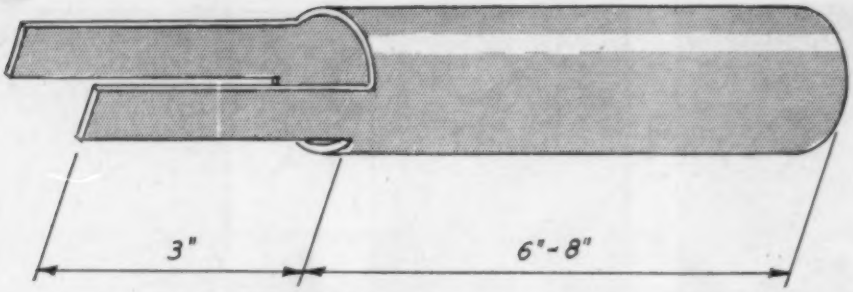


## Fabricate an "A"-Frame For Station Maintenance

The "A" frame shown here can be telescoped to almost any size, and, with its eight ball-bearing casters, it can take tremendous loads.

Note the holes in the vertical members which make it possible to vary the height. To vary the width, simply clamp a longer or shorter piece of 3-inch pipe between the two risers.

Double casters at each of the four corners are used to enable operators to pick up loads up to three tons. When in service for lighter jobs, it is advisable to remove one caster at each corner to make the portable A-frame easier to move.

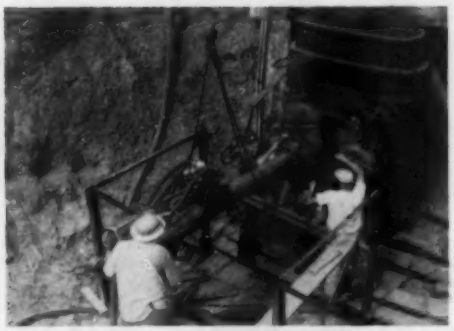



## Tool Lines Up Compressor Valve Plates

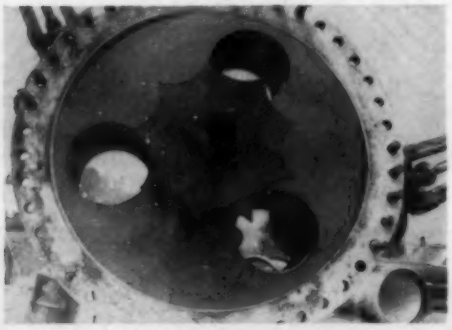
To help line up compressor valve plates, make two tools like the one shown from 1-inch pipe. Cut the section of pipe the proper length to provide six to eight inches for a handle plus the length required to pass from the outside of the stop plate to the inside of smallest plate. Saw out two sections to make fingers to reach through the valve plates. Flatten these two strips, square the edges and round the points. Different size pipe may be used to fit the size of plate valves, but the fingers should always be about 1/16-inch thick to be strong enough to prevent springing open.

Two such tools must be used, one for each side of valve. To install plates, put the largest spring and plate into stop plate and compress, slipping the fingers over on each side; then slip on the next size spring and plate until all are held compressed into stop plate by the tool. Put valve seat on and bolt seat and stop plate together, finger tight. Quickly pull out each tool and finish tightening with wrench. Plates are in line without having to move them over to seat properly.


# TOPAZ cut nine coupons for this "hot" tap!



Tapping machine set up for cutting operation.



Star shaped center coupon, left after nine overlapping 12" cuts were made.

Engineers of TOPAZ and T. D. Williamson, Inc., working with Phillips Chemical Company, had the problem of tapping into Houston's industrial water supply line, (60 psi) without taking the line out of service.

The tap, needed for connecting a branch line, necessitated making a larger hole than any tapping machine could cut in one operation. It was decided to cut nine overlapping 12" coupons, making a 43" hole with a scalloped circumference.

A Model 1200 Williamson-Hillco tapping machine was used for the cutting operation. To reduce time and labor costs, three 12" gate valves were mounted on the adapter flange, allowing three cuts to be made before rotating the flange. Successful completion of this assignment serves as one example of the many ways in which TOPAZ serves the pipeline industry.

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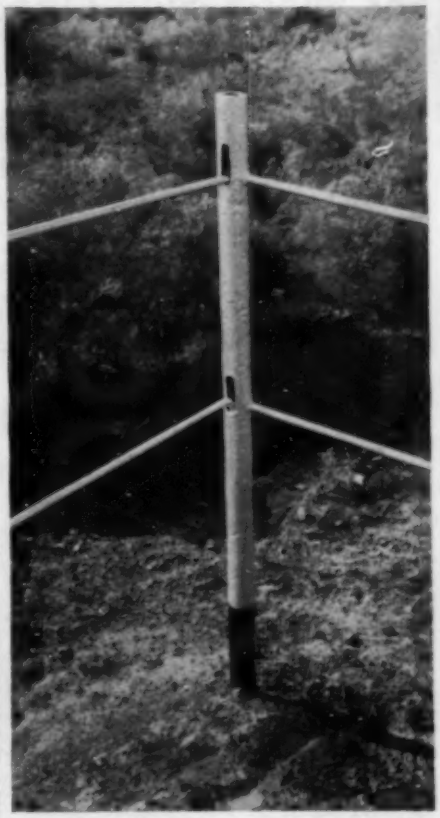

## Removable Fence Rails Provide Quick Access

Use removable rails around field pumps, valves or at other locations where quick access for trucks may

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PROJECT
Whether it is as a backhoe, dragline or any other attachment needed for the job, pipeline contractors the world over recognize Insley as a "proven performer" capable of maintaining maximum output regardless of the type of terrain or working conditions. The inherent dependability and simplified maintenance of Insley equipment has earned an enviable reputation. Let your Insley distributor "show you an Insley at work."
The Insley Manufacturing Corporation of Indianapolis has been manufacturing construction equipment since 1907. The Insley Line includes excavators and cranes, 5 to 30 ton capacity—rubber or crawler mounted.
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LOS ANGELES

be needed but a gate is not often required.

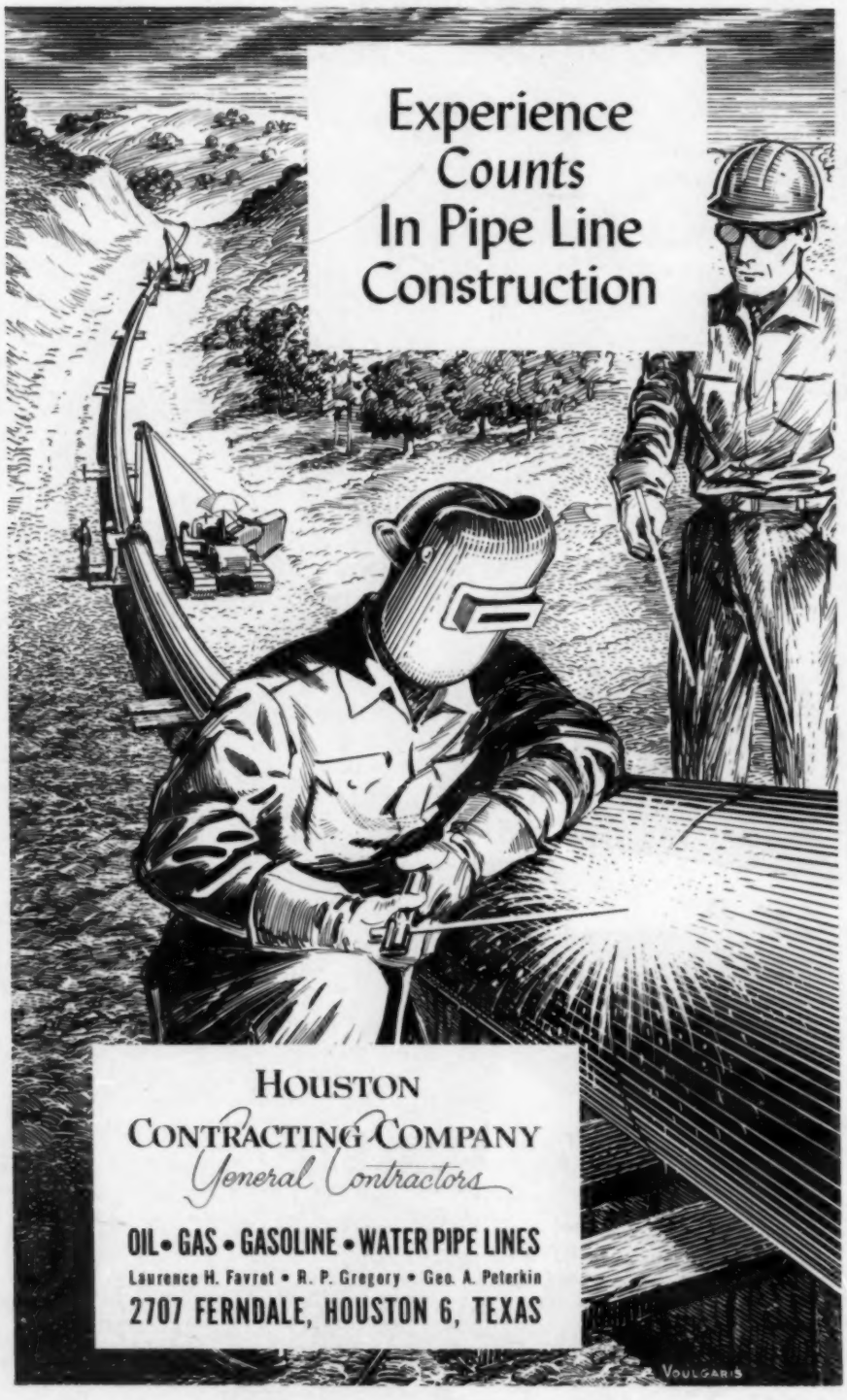
Make rails from 10-foot lengths of sucker rod and bend down two inches at right angles on each end. To hold the rails, cut slots 2½ inches long in the steel posts as shown. In this case posts were made of 2-inch steel pipe set in concrete.

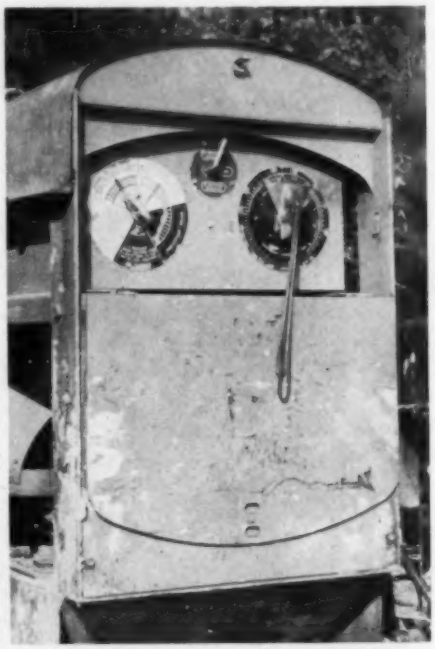
By welding every other set of rods to the posts, and using removable rods between adjacent posts, trucks or machinery can enter enclosures at any convenient place.

## Signs along Right-of-Way Aid Good Public Relations

Pipe line construction crews may not always be welcomed along the right-of-way, but that isn't any reason why they shouldn't make an effort to be good neighbors. Most often they do, as told in the story on page 32 of this issue of PLI.

On the O. R. Burden spread of the Transco job, crews find the right-of-way clearly marked with these signs. It costs only a few cents to have them printed, and they have proven to be a good neighbor relations idea.



## Welder Adds Long Handle To Amperage Control Knob

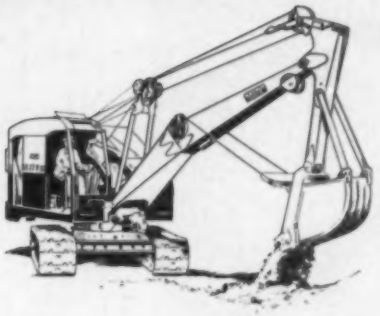
During pipe line construction, by necessity a large number of welding machines are mounted either on high skids or on the bed of a truck. This places the machine controls almost out of reach of anyone standing on the ground.

To solve this problem one welder obtained a three-foot length of ⅜-inch mild steel rod and bent it double. The two ends were brought together and tacked to the handle of the amperage control knob on the machine as shown. With this extension, a man on the ground can adjust the amps on the machine without difficulty.

Length of the handle provides almost 180 degrees of swing for amperage control.

# Here's Why
# Bucyrus-Erie Dragshovels Save Trenching Time and Costs

**YOU'RE OFF TO THE RIGHT START** with a digging stroke that is powerful and steady so the operator can heap the dipper high. Power is concentrated at the dipper teeth for best penetration of even toughest material.



**FOLLOW THROUGH,** with really high-speed hoist and swing, gets dipper out of the trench and into dumping position with no waste of time or operator effort. Hoist and swing action are so smooth that spillage is kept at a minimum.

**FINISHING THE CYCLE,** the dump is clean and trigger-fast. The dipper's high arch, smooth sides and rounded heel are designed for quick easy dumping.

163E55

When you combine this kind of digging efficiency with the dependability that keeps maintenance costs way down, you have the machine you need for fast trenching in tough materials. See your Bucyrus-Erie distributor soon for complete details.

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YEARS OF SERVICE to Men Who Shape the Earth

A ¾-yd. Model 22-B dragshovel, equipped with tractor-type treads, digs ditch for 24-in. natural gas pipeline in northern Pennsylvania.



For more data on advertised products, use Readers' Service Cards, last page.

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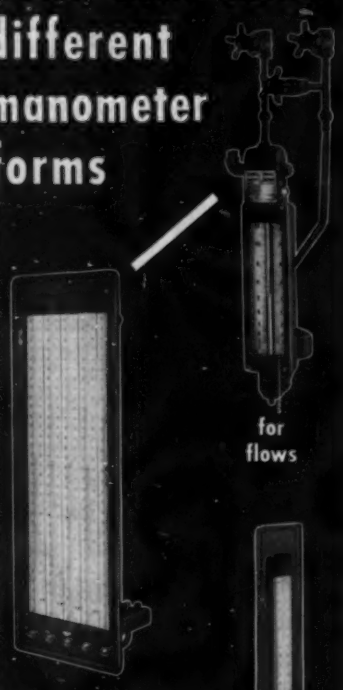


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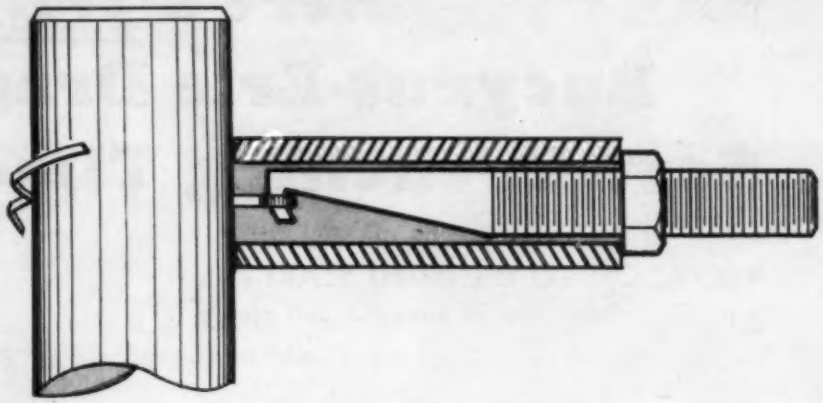

Cotter Pin Extractor

## Save Time with Cotter Pin Extractor

Removing connecting rod bolts on large engines can often take over an hour, but an inexpensive shopmade tool can do the job in a few minutes.

To make the tool, use a large Allen wrench. Grind it round until it can be threaded with a ½-inch bolt die; then cut off a piece 4¼ inches long and thread 2½ inches on one end. (Note: An Allen wrench is used because it will stand the punishment of impact where an extractor made from bolts has failed.) Taper the other end down and grind a hook about ⅛-inch round and ¼-inch deep.

Use a steel sleeve as shown to hold back against the extractor. Slip the sleeve over the hooked piece and run a standard ½-inch hex nut on the threaded end. When the hook is in the eye of a cotter pin, slip the steel sleeve on and push down against nut on connecting rod bolt; run the ½-inch hex nut down to pull the cotter pin out.

A deep wall socket and a small ½-inch drive impact wrench will pull a large cotter pin without having to straighten the pin once the hook is in the eye. A cotter pin can be removed in about three minutes.

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**GOTKOOL Water Can**—made in 1½, 2, 3, 5, 10, 15, and 20-gallon sizes without faucets. Extended or recessed flush-mounted faucets available at slight additional cost. *(Note: 15- and 20-gallon sizes available with extended faucet only.)*

**GOTKOOL Water Cooler**—made in 2, 3, 5, 8, 10, 15, and 20-gallon sizes with extended or recessed flush-mounted faucet optional. *(Note: 15- and 20-gallon sizes available with extended faucet only.)*

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H. P. GOTT MANUFACTURING COMPANY
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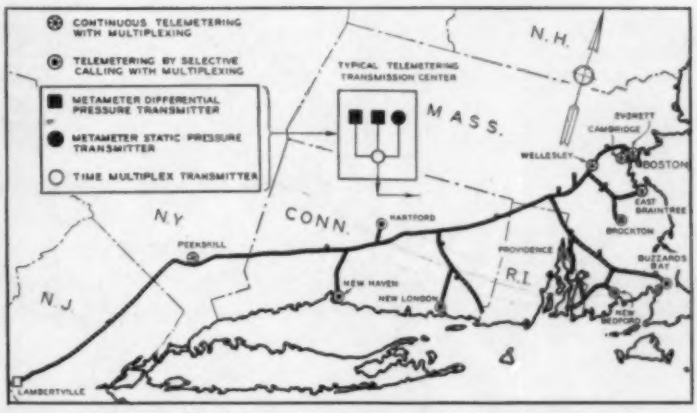
WHAT'S NEW AT BRISTOL...

**EASY-TO-READ** Bristol Metameter Telemeters at Algonquin Gas continuously record information on twelve measurements of static and differential pressures in the Boston area. Bristol Multiplex receivers (bottom row) segregate incoming signals and direct them to proper receivers.

# Continuous, system-wide telemetering pays off for Algonquin Gas




**MAP SHOWS** Bristol telemetering equipment on the Algonquin Gas Company's pipeline.

Every gas company sells two commodities. Gas — and service. *Reliable* service. Service that builds confidence. Service that turns prospects into customers, customers into friends.

How to achieve this kind of service? The Algonquin Gas Transmission Company of Boston finds the answer in a Bristol Metameter® Multiplexing Telemetering system. With the help of the Bristol installation, Algonquin can supply gas to its customers at pressures which the customers have determined are best for their operation — with an absolute minimum of service discontinuities.

Why Bristol equipment? Because Algonquin felt it was simply good business to deal with the acknowledged leader in telemetering equipment. Let us tell you how Bristol's 65 years of instrument experience can help you, too. Write for Bulletin M1710 to The Bristol Company, 114 Bristol Road, Waterbury, Conn. 4.38

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Everyone of us wants to get the most possible out of what we spend—but we soon learn to look twice at "bargain" prices and bids. Usually, a "bargain" just sounded that way the first time you heard it. Check the quality and service of the company and you'll probably back off.

In our line of business—"Putting PERMANENCE in pipe"—good service is mighty important to you, and us. We figure we're going to work pretty close with you while your job is in our yard, and we're going to live with the reputation you help us make so we stress quality work and good service all down the line. That's why our first cost is your last cost which makes our cost your least cost.

Yes, sir, it's like John Ruskin said, ". . . business prohibits paying a little and getting a lot—it can't be done. If you deal with the lowest bidder, it is well to add something for the risk you run. And if you do that, you will have enough to pay for something better." In the end, it boils down to this: You only get what you pay for!

**For over a quarter of a century** Mayes Bros. has been putting PERMANENCE in pipe with top quality materials and the know-how of good workmen. This means the finest service to you at a reasonable cost.

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# Pipe Line Men

## IN THE NEWS

Malcolm E. Powell

J. R. Wright

Roland E. McDonald

Homer Cranfill

Among supervisory personnel recently promoted by **Magnolia Pipe Line Company** was **Malcolm E. Powell,** superintendent of the western division at Midland. He will be advanced to assistant general superintendent of the company with headquarters in Dallas. Powell began his career with Magnolia in 1931 as a laborer. He was made division superintendent in 1949.

Succeeding Powell will be **J. R. Wright,** who has been assistant superintendent of the southern division with headquarters at Houston. He has been with the company since 1931, serving as pipeliner, station engineer, field gager and assistant superintendent of the North Basin district and Beaumont Pipe Line district. In 1952 he was made assistant superintendent at Houston.

**Roland E. McDonald** was advanced from superintendent of Magnolia's Southwest Texas district with headquarters at Alice, to assistant division superintendent at Houston, to succeed Wright. McDonald's first job with the company was material man in 1926. After serving as district foreman and assistant district superintendent at Vanderbilt, he was transferred to Alice in 1951.

**Homer Cranfill,** chief gager for North Texas and Southern Oklahoma, will be promoted to superintendent of the Southwest Texas district at Alice replacing McDonald. After working as stock gager, station engineer, field and district gager, Cranfill was made chief gager for the southern division in 1950 at Alice, later moving to Wichita Falls in the same capacity.

The transfer of **C. R. Smith,** chief gager in Magnolia Pipe Line Company's western division with headquarters at Midland, to Wichita Falls to succeed Cranfill, also has been announced. **Arnold Balke,** gager foreman for the Midland gathering system, will be promoted to chief gager for the western division at Midland, and **H. C. Minyard,** field gager in the Healdton gathering system is being advanced to gager foreman for the Midland gathering system with headquarters in the Pegasus field in Midland County, West Texas.

•

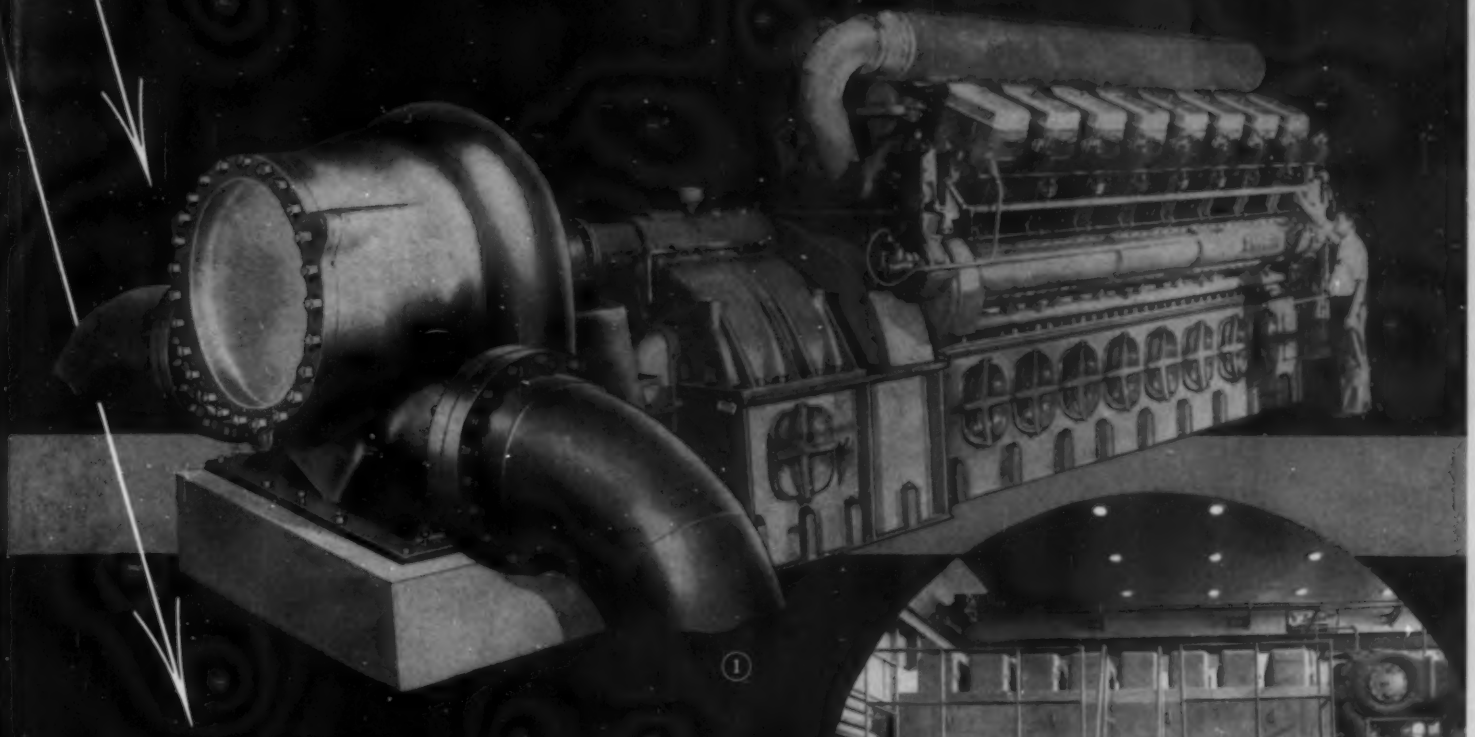
Several organizational changes in the Gathering department of **Panhandle Eastern Pipe Line Company** recently were announced.

**C. R. Horn,** formerly of the Production department in Kansas City, was transferred to Liberal as superintendent of gas supply. He will supervise operations of the reservoir and proration engineering section and gas purchase contracts.

Compressor and gasoline extraction operations have been combined under the supervision of **E. O. Nelson.** The Compressor department will have two assistant superintendents: **E. D. Stockton** responsible for operation and maintenance of engines, building and yard piping, and **W. R. Kesler,** specializing in gasoline plant operation, dehydration and water treatment.

In another change, the well testing section was incorporated into the Gas Measurement department under **A. H. Hathaway.** Headed by **F. A. Richmond,** the section formerly was under the Production department.

# CUT COSTS on these 3 basic power jobs with NORDBERG *Supairthermal*® ENGINES...



① **for GAS COMPRESSOR DRIVE** Big savings in fuel costs on large capacity gas pipe lines and in refineries can be realized with the Nordberg *Supairthermal* engine gear set, driving a centrifugal gas compressor, for the simple reason that less fuel is required.

② **for PIPE LINE PUMPING** In pipe line pumping service, the trend is toward Nordberg four-cycle *Supairthermal* engine power . . . these engines produce more power in less space—substantially reducing installation and operating costs. What's more—the efficiency of these powerful engines turns low fuel consumption rates into *profit dollars* at the end of the line.

③ **for POWER GENERATION** Nordberg *Supairthermal* engine generating units supply reliable low cost electric power for many petroleum industry applications.

• Nordberg four-cycle *Supairthermal* engines are available in a full range of sizes from 535 to 5000 hp for Diesel, Duafuel® or Spark-Ignition Gas operation, including both In-line and "V" types. The *Supairthermal* principle of operation increases the engine's load-carrying ability at any given speed, over a wide speed range. This reserve power is like *"money in the bank"* when additional capacity is needed. We welcome your inquiry and the opportunity to assist you.

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E. E. Miller

E. S. Murray

Sydney S. Bailey

L. W. A. Campbell

Joseph L. Parrish

T. K. Davis

**E. E. Miller** and **E. S. Murray** recently were elected vice presidents of **Tennessee Gas Transmission Company** by the natural gas pipe line firm's board of directors. Both are veteran company executives.

Miller, who had been general superintendent of operations, has been assigned to the sales department. Murray, formerly chief engineer, was designated general superintendent.

In four additional promotions, **Sydney S. Bailey,** eastern sales manager with offices in New York, was made sales manager. **L. W. A. Campbell,** assistant chief engineer, was promoted to chief engineer. **Joseph L. Parrish, Jr.,** supervising engineer, and **T. K. Davis,** superintendent of gas control, were named assistant general superintendents.

Both Miller and Murray were experienced pipe line engineers when they joined Tennessee Gas: Miller in 1944 as an engineer and Murray in 1943. Miller was made general superintendent in 1954 and Murray became chief engineer in 1951.

Bailey, with the company since 1951, has been eastern sales manager since 1954. Campbell, who was first an engineer in 1947, became assistant chief engineer in 1954. Parrish, with the company since 1947, was made supervising engineer in 1955; and Davis, who joined Tennessee Gas as a dispatcher in 1946, was made superintendent of gas control in 1951.

•

**Carl K. Mount** has joined **Transcontinental Gas Pipe Line Corporation** as gas contract representative in the Gas Supply department. He began his career with the Oil Center Tool Company in 1930 where he was sales engineer and assistant production manager. In 1941 he became partner and consultant for the firm of Bates, Wharton and Mount, and in 1944 went with Southwestern Oil and Refining Company as production manager.

The firm of Mount and Journeay was formed in 1947 and for three years Mount was petroleum consultant and partner for this company. He then became production manager of Thomas Jordan, Inc. In 1953 he went into partnership, as an independent lease broker, under the firm name of Simpson and Mount.


"We know all our loads will travel safely since we use only LeBus Load Binders. They are superior in every way."

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**W. R. Griffin, Jr.**, assistant treasurer of **The Texas Pipe Line Company**, recently was promoted to comptroller. He joined the company in 1937 as clerk in the General Accounting office, being promoted to chief accountant in 1950 and assistant treasurer in 1952.

•

**R. O. Landrith** has been named assistant purchasing agent of **Sinclair Pipe Line Company** with headquarters at Independence, Kansas. He will assist **G. O. Ash,** purchasing agent in management and operations.

•

**F. B. Neptune** has been promoted from acting manager to manager of products pipe lines and terminals in **Phillips Petroleum Company's** Supply and Transportation department. He also has been elected a vice president of **Phillips Pipe Line Company,** wholly owned subsidiary of Phillips Petroleum.

F. B. Neptune

Neptune started with Phillips Research and Development department in 1931, transferring to the Pipe Line department in 1936. Three years later he became superintendent of Phillips East Chicago, Inc., terminal. Neptune returned to Bartlesville in 1943 as assistant manager of products pipe lines. He was named acting manager in February of this year and a month later was elected a director of Phillips Pipe Line Company.

•

Election of **S. Lloyd Nemeyer** as president and a director of **Milwaukee Gas Light Company** was announced recently by the board of directors. Nemeyer succeeds **Dudley B. W. Brown,** who resigned to become vice president and secretary of American Natural Gas Company.

Nemeyer, who has been with Milwaukee Gas as a consultant on financial and operating matters since 1943, will leave his position as partner in the independent accounting firm of Arthur Andersen & Company, where for six years he has been in charge of the Public Utility department in the Chicago office.

EITHER WAY...

ROSKOTE PAYS

Whether applied by Roskoter* (top), brush (bottom) or spray, Roskote *cold-applied* mastic's drying speed and handling ease cut manhours from work schedules. Yet it costs only three cents per square foot of coverage.

Roskote dries to the touch in 20 minutes and is ready for backfill in an hour. It bonds readily to previous coatings of coal tar or asphalt and is *non-toxic.*

This tough, natural resin-base mastic sets to a flexible film without brittleness or sag through a temperature range of —40°F to 375°F . . . withstands the pressure, strain and abrasion of the meanest soils. Roskote alone has an electrical resistivity of 20 megohms per sq. ft. and is highly resistant to the corrosive attack of acids, alkalies, salts and moisture.

Find out for yourself why over 100 major utilities and pipeline companies specify Roskote for their "tough" jobs. Write for complete technical information and free sample, and while you're at it ask about application by Roskoter, Royston's revolutionary new coating device.

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•

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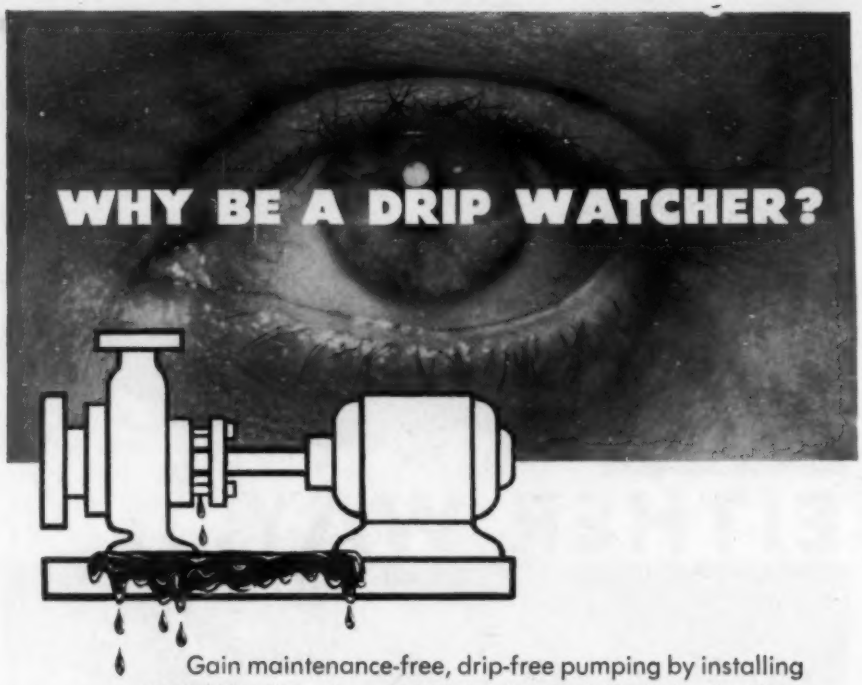
ROSKOTE

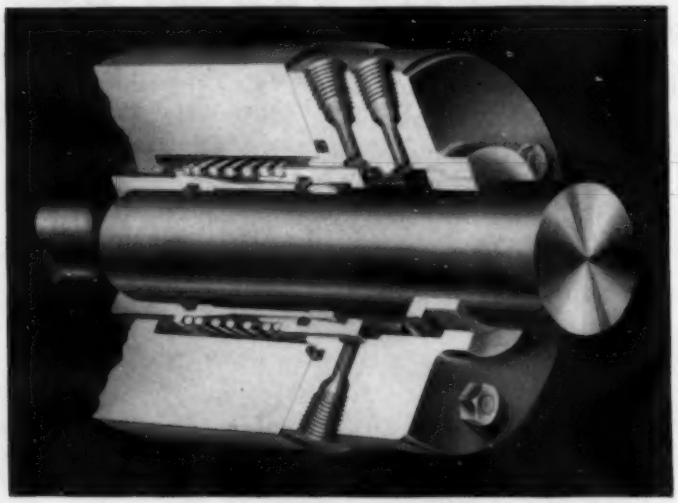



For more data on advertised products, use Readers' Service Cards, last page.




Gain maintenance-free, drip-free pumping by installing Sealol-Flexibox Type RRCB Mechanical Shaft Seals. They replace conventional, leaky packings without pump alterations . . . they prevent product loss and eliminate a major fire hazard.

Supplied in a complete range of sizes, Type RRCB Seals are engineered specifically for your pipeline pressures. They come complete with circulation connections for cooling or heating the seal, for controlling pressure at the seal area, and for preventing accumulation of sediment or polymers. Type RRCB Seals are also fitted with throttle bushings and vent and drain connections for extra protection.



Write today for Bulletin 10, or ask for detailed recommendations on your own pipeline pump sealing requirements.

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**SEALOL**

THE BALANCED PRESSURE SEAL

Donald M. Taylor

R. C. Ledford

**Donald M. Taylor,** editor of PIPE LINE INDUSTRY, has been elected president of the Houston Pipeliner's Club for 1955-56. At its meeting September 19, the club also named **R. C. Ledford,** Marine Gathering Company, vice president.

The complete slate of new officers includes **R. E. Schuhmann,** Trunkline Gas Company, secretary; **Wilbur L. Moore,** Humble Pipe Line Company, treasurer and assistant secretary; and two new directors, **Robert J. Lingle,** Secco Pipe Coating Corporation, and **Fred Lee,** Shell Pipe Line Corporation.

•

**Lars C. Jensen, Service Pipe Line Company** division coordinator, Nebraska division, recently was transferred to the Kansas division with headquarters in Wichita. Joining the company in 1940 as a laborer, Jensen was appointed material and time supervisor in 1946 and was made area coordinator for the Nebraska division with headquarters in Topeka in 1949.

•

**Panhandle Eastern Pipe Line Company** has announced the appointment of **Kenneth W. Richardson** as Central Pipe Line division engineer with headquarters at Glenarm, Mo. Replacing **Anthony B. Bartoszek,** now a pipe line engineer, Richardson has been with the company since 1948 when he was assistant engineer in the Engineering department. He was made resident engineer in 1950.

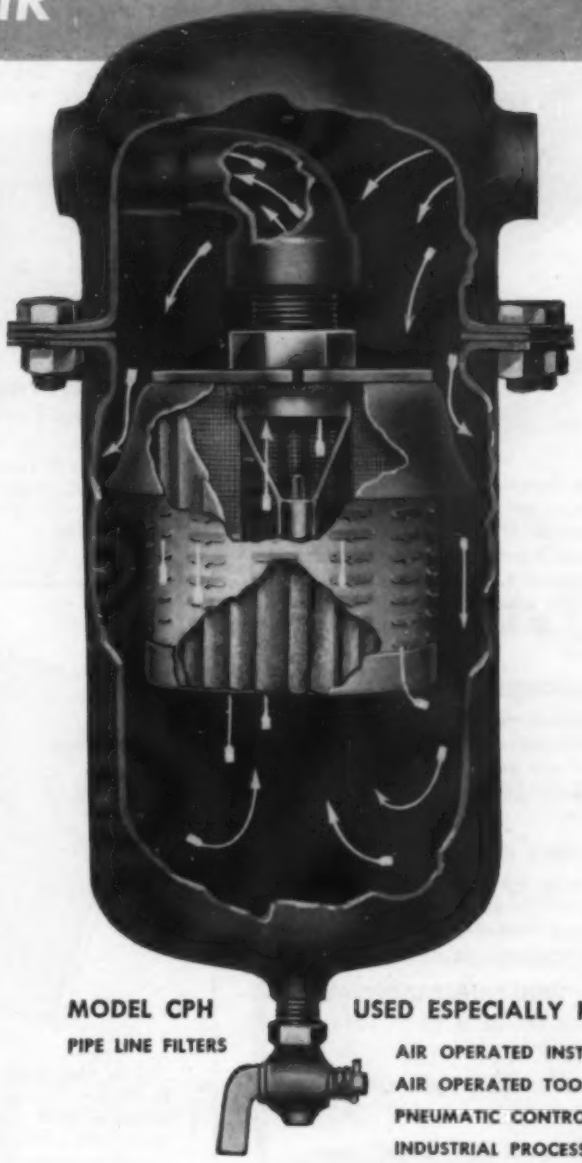
•

**E. W. Bergquist,** training and safety advisor in the Employee Relations department of **Interstate Oil Pipe Line Company,** has been named assistant district superintendent of the Magnolia district. **Lowell L. Long,** former personnel assistant in the department, has been made annuities and benefits advisor.

# SPECIFY STAYNEW PIPE LINE FILTERS

## FOR CLEAN, DRY AIR

**GUARD AGAINST** | **WATER OIL PIPE SCALE**



Staynew's "double-action principle" assures sustained, trouble-free operation at high load factors.

1. Deflector cup directs flow of air or gas, together with water, oil and dirt, to the walls of the housing and then downward at high velocity into the base, where water, oil and heavier particles of rust, scale and dirt are deposited.

2. The air or gas having been mechanically cleaned, rises at low velocity through the Radial Fin Filtering Insert which removes the lighter air-borne material.

Efficient design eliminates need for frequent cleaning. Interior parts of filters are easily accessible for inspection and cleaning.

Inexpensive, quickly installed and easily maintained, these filters keep air operated or controlled equipment free from pipe scale, dust, dirt, and condensate. Wherever you require air and other gases *clean* and *dry*, specify Staynew Pipe Line Filters.

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PIPE LINE FILTERS

**USED ESPECIALLY FOR:**
AIR OPERATED INSTRUMENTS
AIR OPERATED TOOLS
PNEUMATIC CONTROLS
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**WRITE** for Bulletin 200 containing photos, charts and engineering data. Our Engineering Department welcomes the opportunity to help solve your air filtration problems.

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ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED



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PRESSURE & TEMPERATURE
CONTROLS
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*Only Mercoid Offers*

● *HERMETICALLY SEALED CONTACT*

*Always dependable—whether it operates once per year or several times per minute. It remains operative at all times because dust, dirt, grease or moisture cannot contaminate the contacting elements. There can be no sticking or welding of the contact points.*

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*Independent outside adjustments are provided for setting both the cut-in and cut-out points. Differential may be widened as desired. No tools are required.*

● *VISIBLE CALIBRATED DIAL*

*No guesswork or calculations are required—the pointers indicate on an accurately calibrated dial, the exact operating pressures or temperature.*

● *VISIBLE OPERATION*

*You can tell at a glance whether switch circuit is on or off.*

● *BOURDON TUBE OPERATED*

*UNDERWRITERS' APPROVED*

*All operating ranges for Series DA-21, DA-35 and DA-55.*

*Available for general use, outdoor use or hazardous locations.*

WRITE FOR BULLETIN 4B

THE MERCOID CORPORATION
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# What's Happening

## AMONG SERVICE AND SUPPLY MEN

### BJ Stockholders Approve Merger with Borg-Warner

Byron Jackson Company stockholders approved plans for a merger with Borg-Warner Corporation at a recent meeting held at Byron Jackson's headquarters offices in Los Angeles. The merger plan provides that Borg-Warner will exchange four shares of common stock for each five shares of Byron Jackson.

Byron Jackson will retain its management and operating policies, becoming the Byron Jackson division of Borg-Warner Corporation.

Byron Jackson Company is a pioneer West Coast manufacturer established in 1872. Its principle products are oil tools, centrifugal pumps, electronic instruments and oil field industrial and rubber products. It has recently been expanding in the electronic and nuclear fields. Borg-Warner is a leading manufacturer of automotive, aircraft equipment and agricultural implement parts.

### Allis-Chalmers Promotes Two In Centrifugal Pump Department

Appointment of Hugh L. Ross and Charles L. Babb as assistant manager and chief engineer, respectively, of Allis-Chalmers Centrifugal Pump department has been announced.

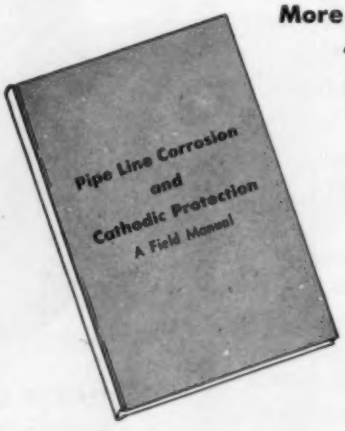
Ross had been chief engineer of the department since 1945; prior to that he was engineer-in-charge of pump design. He joined Allis-Chalmers in 1928. Babb, who had been engineer-in-charge of centrifugal pump design, joined the company in 1924.

### New Norberg Sales Engineer To Work in Canada and U. S.

Philip R. Coerper, who recently joined Nordberg Manufacturing Company as sales engineer, will assist engine distributors and will serve the railroad industry and original equipment manufacturers throughout the U. S. and Canada. He will make his headquarters in the main office in Milwaukee.

Philip R. Coerper

Coerper has previously been with Cutler-Hammer Corporation, Union Manufacturing Company and Cities Service Oil Company. In 1953 he joined the Wisconsin Axle division of Rockwell Spring and Axle Company, supervising manufacture of gears, shafts and final axle assembly.




**More comments on this new Handbook:**

"... a most practical on-the-job manual for men concerned with pipe line corrosion. We are ordering copies for each of our district engineers."

**Pipe Line Corrosion and Cathodic Protection**

By MARSHALL E. PARKER

This Handbook, written by Marshall E. Parker, consultant, is designed as a practical field manual. It is a 108-page pocket-size volume printed first as a popular series in WORLD OIL. The Handbook is illustrated with many charts and drawings and is completely indexed by subjects.

It presents comprehensive data on Soil Resistivity Surveys, Potential Surveys, Line Currents, Current Requirements, Rectifier Systems, Ground Bed Design, Magnesium Anodes, Stray Current Electrolysis, Interference in Protective Systems, Operations and Maintenance, and Coating Protection and Testing.

An appendix has been added of technical data on Underground Corrosion, Basic Principles of Cathodic Protection, Properties of Metals and Attenuation Equations. Order copies of this practical Field Manual now for each of your field men. Price $3.

Send for your FREE copy of the New Petroleum Book Catalog which describes the nature and contents of many books pertaining to the Petroleum Industry.

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**GULF PUBLISHING COMPANY**
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HOUSTON 1, TEXAS

## New Pritchard Representative In Calgary is Earl Colburn

L. Earl Colburn has been appointed technical sales manager for Poole-Pritchard Ltd., engineers and constructors for the chemical gas and petroleum industries with offices in Calgary, Alberta, Canada.

L. Earl Colburn

The Poole-Pritchard organization is a combination of the Poole Construction Company, Ltd. of Edmonton and J. F. Pritchard & Company of Kansas City, Mo., with an area of operations in Western Canada from the Great Lakes to the Pacific.

Colburn joined the Pritchard organization in 1946 as a process engineer.

## Communications Expert Named Florida Distributor by DuMont

Appointment of Col. Grant A. Williams as Florida distributor for mobile communications products of Allen B. DuMont Laboratories, has been announced. He comes to DuMont with a varied background in the electronics field. After 19 years in the U. S. Army Signal Corps, he served in a managerial and consulting capacity with the International Telephone and Telegraph Company in Cairo, Egypt, and Vienna.

## Paul Duncan to Represent H. K. Porter in Washington

Paul Duncan, new representative for H. K. Porter Company in Washington, D. C., formerly was with Selvage & Lee, Washington public relations counsel, specializing in legislative and government relations. H. K. Porter Company is opening office in the Trans Lux building where Duncan will maintain headquarters.

**STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP MANAGEMENT, AND CIRCULATION OF** PIPE LINE INDUSTRY, published monthly at Houston, Texas, for October, 1955.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Ray L. Dudley, 3371 Chevy Chase, Houston, Texas; Editorial Director, Warren L. Baker, 5324 Cherokee, Houston, Texas; Editor, Donald M. Taylor, 1345 Chamboard, Houston, Texas; Managing Editor, Wallace Fitzgerald, 1514 Hewitt Drive, Houston, Texas; Business Manager and Executive Vice-President, A. L. Burns, 7 Chelsea Place, Houston, Texas.

2. The owner is: The Gulf Publishing Company, Houston, Texas; James Anderson, Houston, Texas; June Wooden Dudley Bliss—Trustee, Houston, Texas; A. L. Burns, Houston, Texas; Grace C. Carter, Dallas, Texas; Margaret D. Cashman, Houston, Texas; P. Stinson Dudley, Eldorado, Texas; Ray L. Dudley, Houston, Texas; Wm. G. Dudley, Houston, Texas; Wm. V. Gross, Fort Davis, Texas; Carolyn Dodson Keeble, Abilene, Texas; Anita S. Lane, Houston, Texas; Charles H. Lane, Houston, Texas; James William Nelson, Baytown, Texas; Tom W. Nelson, Houston, Texas; Walter Gage Sterling, Trustee, Houston, Texas; O. R. Waller, Chicago, Illinois; Patricia McFarland Windham, Austin, Texas.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

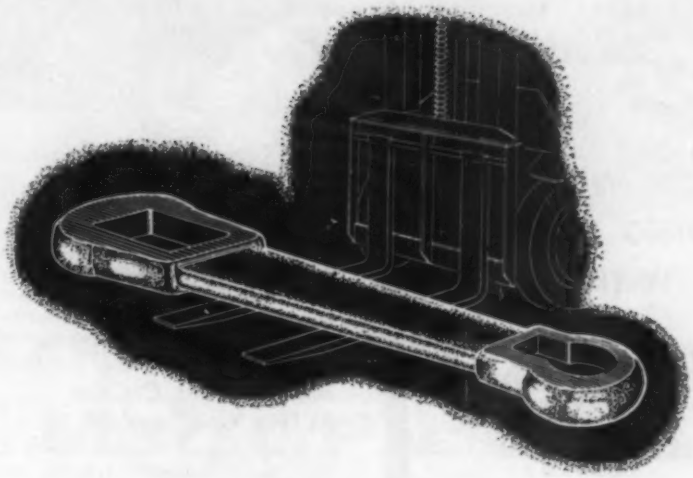
5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

A. L. BURNS,
Business Manager and Executive Vice President.

Sworn to and subscribed before me this 15th day of September, 1955.

P. J. AUCOIN,
(Seal) Notary Public in and for Harris County, Texas.
(My commission expires June 1, 1957.)

*Worn?*
*Mismachined?*



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**Connecting rods, power cylinders, shafts, rods—i.d. or o.d. surfaces—all can be restored to design dimensions by the application of VANDERLOY.**

**VANDERLOY*** **an electrolytic iron that bonds atomically with most ferrous metals, aluminum, copper, nickel and their alloys.**

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**HOLDS PARAFFIN IN SUSPENSION**
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## *GM Sends Mobile Training Unit to Caracas*

**A. F. Brecht, Detroit Diesel's service manager, presents the keys for the new overseas training unit to F. A. Von Schon, service manager of General Motors overseas operations in Detroit. The new unit will operate throughout Venezuela, bringing factory-approved preventive maintenance and overhaul procedures to diesel operators and mechanics in the oil well drilling, construction, agricultural and marine fields. Equipment for the school which is carried on the 12-ton diesel-powered truck includes live engines, cutaways, assemblies of component parts and factory approved tools. Shown from left to right are Edmund Burke, Jr., of Caracas, Von Schon, Brecht, A. T. Baynes, manager special sales activities at Detroit Diesel and R. L. Burpee, Detroit Diesel's merchandising manager.**

### Miller Joins M. C. Crose As New Vice President

M. J. Crose Manufacturing Company, Inc. has announced the appointment of C. G. Miller as vice president. Miller formerly owned and operated the Texas Road Boring Company in Houston. The Crose Company manufactures and distributes specialty and maintenance equipment for the pipe line industry.

### U. S. Steel's Orange Plant Has New Plant Manager

Glenn L. Martin recently was named plant manager of the Orange, Texas, plant of U. S. Steel's American Bridge division. A veteran of 20 years with the Consolidated Western Steel division, Martin was general superintendent of the Consolidated Western plant at Orange from 1953 until its transfer this year to the American Bridge division.

### Allis-Chalmers Announces Plans For Tractor Group Expansion

A $1.8 million expansion program for shops and offices of the Cedar Rapids, Iowa, Works is planned by Allis-Chalmers Manufacturing Company. The company's motor scrapers and motor wagons are made at the plant.

The main office building will be enlarged and a new experimental and engineering laboratory erected. Plans call for the enlarging of shops and offices to increase productive capacity by 50 percent. The program, to start immediately, is scheduled for completion early in 1956.

### Robinson and Briggs Receive Sales Promotions at Tube Turns

W. C. (Bill) Robinson, recently appointed an assistant sales manager of Tube Turns, will have an important role in the sales promotional programs inaugurated in the company's eastern division territories. Formerly a sales representative, Robinson was with Robert H. Clark Company before joining Tube Turns in 1944.

In the Sales Development department, Frank Briggs has joined the staff. With Tube Turns since 1942, he has been with the Sales department since 1947, handling inquiries for special welding fittings, assisting in coordinating raw material requirements and setting up scheduling procedures.


**NOTICE:** Specify **PELCO** Welding Saddles

No change except the corporate name. We still have the same ownership, same management, same address, same telephone, and use the same 45 years of experience to render the same service under the same trade name—"PELCO."

**PELICAN SUPPLY CO. INC.**
P. O. Drawer 1108 Shreveport (84), La.
SEE YOUR NEAREST SUPPLY HOUSE

## Assistant to Vice President Appointed by A-C Tractor Group

Robert S. Reaves, appointed assistant to the vice president, director of engineering, Tractor Group, Allis-Chalmers Manufacturing Company, succeeds Harold W. Schudt, now president of Canadian Allis-Chalmers, Ltd. Reaves joined the company as a student engineer in 1935 and became a member of the Springfield Works Engineering department after completing his training program. In 1938 he transferred to the La Crosse Works Engineering department.

Robert S. Reaves

## New Resident Manager to Head Rockwell Offices in Caracas

George L. Geuss, assistant product manager of Rockwell Manufacturing Company's Meter & Valve division, has been named resident manager in Venezuela, with offices at Caracas. With the company since 1940, he has been a service engineer in the Buffalo and New York City territories. He was named assistant manager, Nordstrom Products, in 1954.

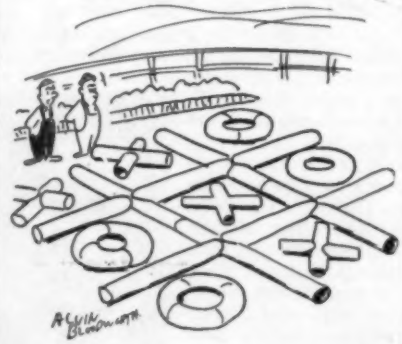
## Toledo Pipe Threading Names Hartsing Field Sales Manager

The Toledo Pipe Threading Machine Company announces the appointment of C. E. Hartsing as manager of field sales. On Toledo's sales staff many years, Hartsing served as western sales manager prior to his recent appointment. In his new post he will be in charge of Toledo's enlarged sales force of 21 salesmen in the U. S. and Canada.

## Rockwell Begins Construction On Million Dollar Parts Plant

Ground has been broken and contracts awarded for construction of a new 104,000 square foot parts plant in Russellville, Ky., for Rockwell Manufacturing Company. The new plant, slated for completion early next year, will turn out parts for all Rockwell products.

Located on U. S. Highway 68, the one-story building will have an exterior of masonry and insulated aluminum panels and interior walls of glazed tile.



PIPE LINE INDUSTRY

"The boys had a little game while waiting for the go-ahead"

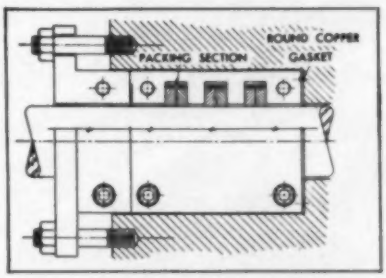
*Left:* Reciprocating air compressor

*Below:* Garlock 809 Floating Metal Packing split-case design

For air compressors, users report

# GARLOCK SPLIT-CASE METAL PACKINGS

have 2 big advantages




1. **LONG, TROUBLE-FREE LIFE.** Minimum of 7 years with proper lubrication.

2. **CAN BE INSTALLED *WITHOUT* DISCONNECTING THE ROD.** Downtime is reduced to a minimum.

You can eliminate the cost of frequent packing replacements and unnecessary downtime by installing Garlock split-case metal packings on your reciprocating air compressors. Service reports show that these Garlock metal packings have given 15 years and more of trouble free service with a minimum of rod wear.

For complete information, call your Garlock representative or write today for Brochure 3889.

**THE GARLOCK PACKING COMPANY, PALMYRA, N. Y.**

**Sales Offices and Warehouses:** Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, Los Angeles, New Orleans, New York City, Palmyra (N.Y.), Philadelphia, Pittsburgh, Portland (Ore.), Salt Lake City, San Francisco, St. Louis, Seattle, Spokane, Tulsa

**In Canada:** The Garlock Packing Company of Canada Ltd., Toronto, Ont.

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PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS, RUBBER EXPANSION JOINTS

## *Southeast's Largest Gas Meter Repair Center Opened*

**The largest gas meter repair center in the Southeast was opened recently by Rockwell Manufacturing Company. It adjoins Rockwell's Meter and Valve division Southeastern regional headquarters in Atlanta. Designed primarily for repair and servicing of gas equipment, the one-story building also will be used for repair of other products of the division such as water meters, petroleum and industrial liquid meters and Rockwell-Nordstrom lubricated plug valves.**


**MOVE HEAVY LOADS EASIER WITH *SAFER* BRADEN WINCHES**

The BRADEN PATENTED OIL-COOLED, FULLY ADJUSTABLE, AUTOMATIC SAFETY BRAKE makes BRADEN Winches safer, and easier to control on heavy handling jobs. This is important when handling extra heavy machinery or equipment that could be badly damaged while being moved.

BRADEN Winches are available in capacities to 100,000 pounds, and in models for all makes of trucks.

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BRADEN Winches


## Cone and Wallace Company Is New Pritchard Representative

The Cone and Wallace Company of Phoenix has been appointed sales representative for the state of Arizona by J. F. Pritchard and Company of California, division of J. F. Pritchard and Company.

Kent Cone has been engaged in industrial sales for 25 years in Arizona, nine years of which were spent as branch manager for a Phoenix industrial supply company. In 1952 he formed the W. K. Cone Company, factory sales and service representative for manufacturers of process equipment.

William Wallace, during the past 11 years, has been a marine engineer, central station power plant superintendent and sales and service engineer of power and industrial plant instruments and controls.

In 1953 the two formed a partnership, The Cone and Wallace Company, to represent process equipment manufacturers in Arizona.

## Veteran Crane Co. Executive Named Assistant Treasurer

Leo L. Daugherty, recently appointed assistant treasurer of Crane Co., is a 32-year veteran of the company's branch system. Joining Crane in 1923, he was later credit manager at Wichita, Kansas, Kansas City, Mo., and St. Louis. In 1953 he was appointed regional office manager at Dallas, a post he held until this year when he transferred to the general office in Chicago as general credit manager.

## Ridge Tool Company Has New Assistant Sales Manager

D. H. Rowe, recently appointed assistant sales manager of Ridge Tool Company, will assist Sales Manager W. L. Parcell in carrying on the company's national sales, advertising and sales promotion program.

D. H. Rowe

Before joining Ridge Tool, Rowe spent four years as advertising manager for the Cleveland Worm and Gear Company and its affiliate, the Farval Corporation. Prior to this, he served as associate editor of New Equipment Digest, a Penton publication.

## Rockwell Announces Appointment Of Market Research Manager

Jack D. Bateman, senior market analyst at Rockwell Manufacturing Company, has been named manager of market research. He succeeds A. Clark Daugherty, recently assigned other corporate duties in addition to maintaining overall supervision of market research and public relations.

Jack D. Bateman

Bateman, who joined Rockwell as a market analyst in 1951, previously spent two years as sales representative for Procter & Gamble Company and a year in public relations work.

John W. Brown

James E. Hughes

## Brown Fintube, Western Supply Sign Representation Agreement

E. D. Anderson

A new agreement of representation and collaboration in the heat exchanger industry has been announced by John W. Brown, Jr., president of Brown Fintube Company, and James E. Hughes, vice president of Western Supply Company. Under the agreement, Western will become sales representatives for Brown in Kansas, Oklahoma and the urban and rural areas of Kansas City, Mo.

Under the affiliation, Brown will be provided with experienced representation for their heat transfer line, including the sectional hairpin finned tube exchanger. Also, certain areas of utilization of Brown fintubes in shell-and-tube exchangers will be made possible. Brown has been developing their finned surface for a variety of applications, while Western has been active in employing finned surface to shell-and-tube use.

E. D. Anderson, Western's chief engineer since 1947, will be especially active in the second phase of this representation because of earlier work at Brown Fintube Company in development of heat transfer data on the basic Brown longitudinal finned surface.

## Union Switch & Signal Awarded Service Communication Contract

Contracts for four centralized transport control systems to govern operations at four Wyoming pump stations have been awarded Union Switch & Signal, division of Westinghouse Air Brake Company, by Service Pipe Line Company. These systems will permit remote control of the flow of crude oil through some 180 miles of pipe line.

The first installation was made at Shoshoni and controlled from Lost Cabin. New orders call for installations at Big Muddy, Owl Creek, Horseshoe and Wendover pump stations which will be controlled from Casper, Kirby, and Welsh stations. The latter station is controlling point for both Horseshoe and Wendover although the control systems will operate independently.

These all-relay systems will enable operators at the controlling stations to actuate pump motors and valves at the pump stations by pressing push buttons. Faults such as hot pump or motor bearings automatically will initiate shutdown of operations at the affected station. Proper sequencing of the operations is automatically insured by system circuitry. Indication lights on a control panel keep operators informed of occurrences at remote locations.

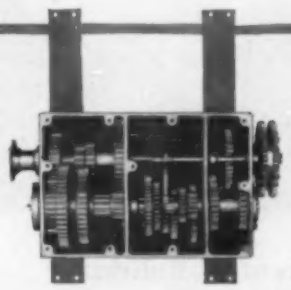
# "This Cleveland 140 is a diggin' fool"

**SO SAYS OWNER,** Frank C. Heckman, Excavating and Trenching Contractor of Santa Fe, New Mexico. His Cleveland is here shown digging trench for the installation of sewer, water and gas lines in a new building project in Santa Fe. Each house requires a total of about 300 feet of trench, all 20 inches wide but varying in depth down to 4 feet.

Heckman does all the trenching for this construction company which erects about 200 buildings yearly in Santa Fe. In addition he does many scattered trenching jobs throughout the Santa Fe area, much of it for utility companies.

He's sold on his Cleveland's speed and maneuverability for digging short runs of trench profitably and on its rugged dependability for turning out high daily production on pipeline and similar big jobs.

**This famous Cleveland multi-speed transmission *has no equal.* It provides 12 individual crawler speeds for each of 4 digging wheel speeds—gives you the *right* speed and power *combination* for *every* trenching job *condition.***



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**THE CLEVELAND TRENCHER COMPANY • 20100 St. Clair Ave., Cleveland 17, Ohio**

**CLEVELAND**




For more data on advertised products, use Readers' Service Cards, last page.

# What's New in Equipment

## for the Pipe Line Industry

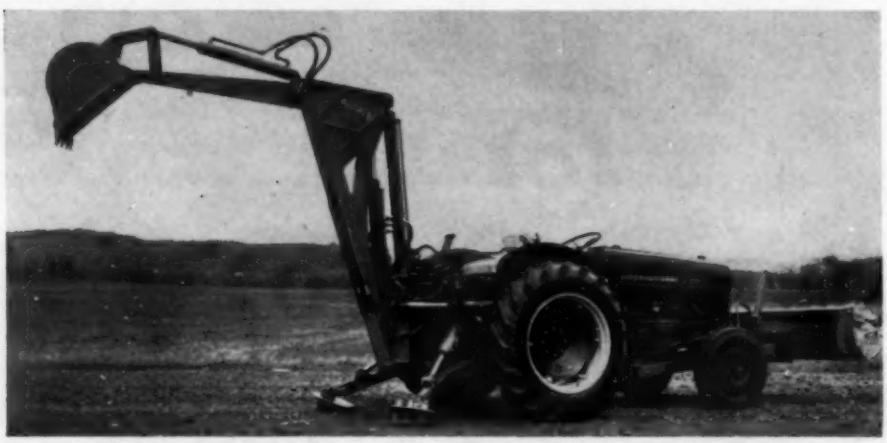
### Tree Crasher

The LeTourneau Tree Crasher, built by R. G. LeTourneau, Inc., builder of the world's largest land-clearing equipment, has been designed to uproot heavy trees and underbrush with push-button ease.

Each of six mammoth wheels has within its rim an individual electric motor and gear reduction. These motors are driven by generators, which, in turn, are driven by two giant diesel engines near the center of the unit. Because of the gigantic dimensions of the tires and because they can operate with air pressures as low as five pounds, the actual per-square-inch weight of the machine upon the ground is about the same as that of a walking man. Such an extreme degree of flotation and the powerful motors for each wheel make the unit well suited for work in swampy or sandy areas.

Another application for the machine is that of transporting heavy loads over rough terrain. Top of the crasher forms a convenient platform 39 feet long and 11 feet wide which is capable of supporting more than 200,000 pounds.

For more data circle **No. E1** on Readers' Service Card, last page this issue.



### Excavator, Bulldozer

Pippin Construction Equipment, Inc., has introduced a new model excavator and angling bulldozer for mounting on the International 300 utility tractor.

The excavator digs to a depth of over ten feet and loads truck to a height of nine feet with backhoe bucket and 12 feet with shovel bucket. The mounting incorporates a strong sub-frame running the length of the tractor. The front drive pump can be used for operation of both excavator and front end attachments.

The angling bulldozer shown features heavy tubular push arm construction with a low pivot point for effective dozing operation. The blade is available with angling bracket for quick angling 12½ or 25 degrees left or right.

For more data circle **No. E2** on Readers' Service Card, last page this issue.

### Automatic Welders

The Lincoln Electric Company has created a new line of equipment for hidden or submerged arc welding. The new line includes three welding heads, controls and adjustments, accessories and two new power sources. The line has been developed to give complete flexibility to Lincolnweld automatic equipment.

The new welding heads offer a choice of heads for either AC or DC current, field or shop welding, and constant potential or variable voltage power source. New operation controls permit a choice of instantaneous starting, either hot for intermittent welding or cold for precision starting; a choice of variable inching speeds, either slow or fast, away from or to the work; a choice of carriage operation to give stand-still starts, flying starts or manual control.

In addition to heads, mounting equipment is available to give either a stationary mounting, mounting on a self-propelled travel carriage or on a self-propelled tractor. The heads can be adapted for Twinarc or tandem arc welding or for an oscillating attachment.

A new Lincolnweld power source has been added to the line in the Lincolnweld AC-750, which gives 750 amperes continuous duty AC power. It has a power-driven reactor control for setting current from remote switches on the welding head

***Save time! Keep informed! Circle numbers on Readers' Service Cards, last page this issue.***

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**New expanded edition of our Famous Tuffy Sling Handbook... Mail coupon for copy today!**

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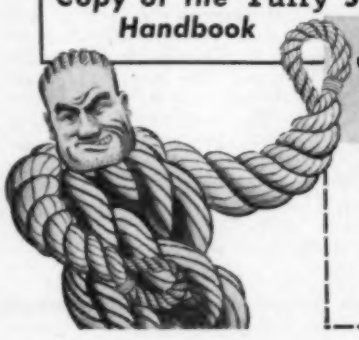
### CONSULT YOUR DISTRIBUTOR

when you want to buy Tuffy Slings or Tuffy Hoist lines to team up with your Tuffy Slings. Give him your requirements. He'll stock an inventory for you to draw against.

**Mail Coupon For Your Free Copy of the Tuffy Sling Handbook**



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11



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# KINZBACH

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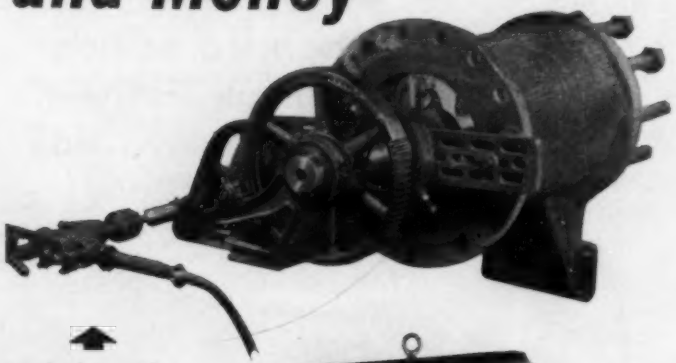
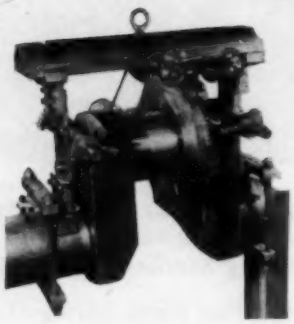
## *Saves Time and Money*



Kinzbach Portable Boring Bar

Kinzbach Crank Pin Turning Machine



A skilled Kinzbach service crew will save you money by doing turning, boring and other operations on your engines and compressors without dismantling major assemblies. The Kinzbach Tool Co. has developed special equipment to handle many pipeline, process plant and refinery repairs and has had many years of experience in this type of work.

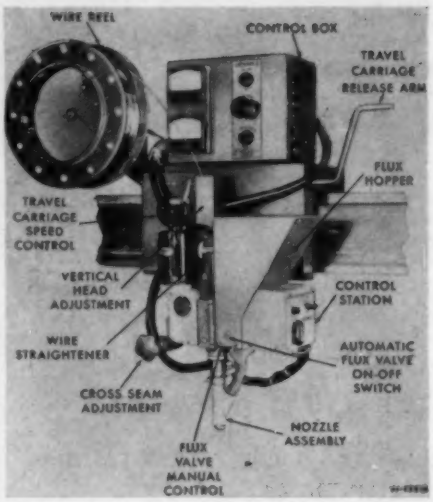
The Crank Pin Turning Machine may be mounted on the crank shaft within the engine, thus turning the crank pin without removing the shaft from the assembly. The machine will turn from 8″ to 12″ crank pins.

The Kinzbach Portable Boring Bar will handle bore diameters from 7″ to 32″ and lengths up to 48″. This machine bolts directly into the cylinder as illustrated.

If your maintenance job falls within these ranges, it's often less expensive to have these operations done by a Kinzbach crew right at your site, rather than dismantling and shipping the machine into the shop. Special adaptations of this equipment are regularly made to fit the needs of a wide variety of special and unusual jobs. Call or write the Kinzbach Tool Company for complete information about this money-saving service.

KINZBACH TOOL CO INC

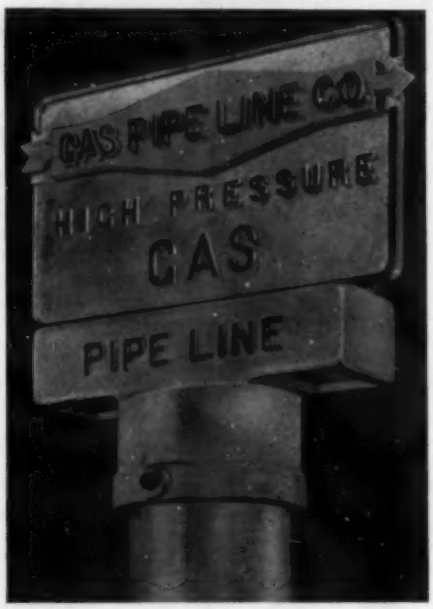
**KINZBACH TOOL CO., INC.**
**P. O. Box 277**
**Houston, Texas**


control box. Taps for Scott connections are available where setting up power supply for tandem welding. These furnish 90 degree phase relationship for welding current from three-phase current supply.

Another new power source is the Lincolnweld DC-750, which is a motor generator machine specifically designed for automatic welding. It is rated at 750 amperes, continuous duty at 40 volts. It can also be paralleled with a second DC-750 for work requiring higher amperages.

For more data circle **No. E3** on Readers' Service Card, last page this issue.




## Marker-Vent

The new L&M Company combination marker and vent, which can be installed quicker and less expensively than a field welded vent, is a one piece aluminum alloy casting with a 7 by 12-inch message panel and screened vents. The message is cast in raised letters and can be painted any color desired. The vent openings are screened with a heavy, rust-proof, perforated metal screen to keep out insects.

Models are available to fit 2, 3 or 4-inch pipe with a weldable collar available. The marker-vent collar is slipped down over the top of the pipe and two Allen screws are tightened to hold it in place.

For more data circle **No. E4** on Readers' Service Card, last page this issue.

## Welding Unit

Substantial fuel savings can be obtained by use of a new welding unit, rather than individual gasoline engine-driven welders. The unit consists of one Caterpillar DI3000 engine connected to a jack shaft which, by means of V-belt drives, power eight 400-ampere Lincoln welders. Attached to the end of the jack shaft with a clutch is a 182 CFM air compressor. Power is steady and welders cannot tell by means of the arc when the air compressor goes on and off.

The unit was made for the Sapulpa Tank Company by McCormick Machinery Company.

For more data circle **No. E5** on Readers' Service Card, last page this issue.

## Breather and Drain

A new, stainless steel universal breather and drain which allows passage of three to four times more volume of air than standard types has been introduced by Crouse-Hinds Company. The new type ECD devices are for use on explosion-proof combination starters, circuit breakers and other equipment housings in Class I, Groups C and D hazardous locations.

The new breathers and drains drain off accumulated water, resulting from condensation, in the base of explosion-proof housing and ventilate the housing by allowing constant circulation of air. Also, larger air passages prevent clogging from dust and dirt.

The units screw into hubs or holes tapped for conduit having five or more threads. This connection assures safety as at least five threads on the breathers and drains will be engaged.

For more data circle **No. E6** on Readers' Service Card, last page this issue.

## Pressure and Temperature Pilot

A. W. Cash Company has introduced a new pilot designed to provide accurate and dependable control of both pressure and temperature.

It is applicable for pressure ranges from 0-15 to 0-10,000 psi, and 0-30" $H_2O$ and 0-30" Hg vacuum. Pressure-sensing elements are available in phosphor bronze, beryllium copper or stainless steel.

Temperature ranges are from —40° F. to 1000° F., with mercury-actuated armored capillary temperature-sensing element available with plain bulb, union connection or union connection with separate socket.

Other features of the pilot include: incorporation of process pressure or temperature gage in the pilot; calibrated set point adjustment; unit construction; feedback proportional control, with 1 to 100 percent proportional band and differential gap; availability with proportional, plus automatic reset action; and all-metal, frictionless power relay incorporating a sapphire jewel nozzle feed orifice with push-button cleaner.

For more data circle **No. E7** on Readers' Service Card, last page this issue.

## Power Wheel Barrow

An all new power wheel barrow has been introduced by the United Sales Company. It is made in two sizes; the junior size is powered by a 2-horsepower gasoline engine and the senior size by a 4-hp gasoline engine.

New features include a self-tipping tray that is controlled by the operator at the handle. Easy throttle control also is at the operator's fingertips. Both units are capable of carrying their full capacity up a 25 degree incline.

For more data circle **No. E8** on Readers' Service Card, last page this issue.


TUBE-KOTE's

TK-2 PLASTIC LININGS

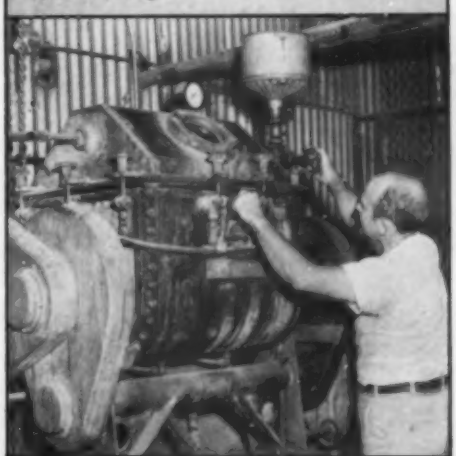
*. . . guaranteed best by 16 years of research!*

Only Tube-Kote plastic linings have the backing of the world's largest and most experienced company coating plastic on oil field equipment—since 1939!

Only Tube-Kote has research laboratories devoted to developing and testing of plastics for lining oil field and chemical equipment. Compounding of plastics is done on Tube-Kote's own premises—under the immediate supervision of Tube-Kote chemists and engineers — which permits **exact** formulation. Tube-Kote has lifted plastic linings from the category of "paint" to a field of scientifically compounded, multiple-layer plastic linings that provide **excellent** protection against corrosion and paraffin.

**Write for literature about TK-2—used on more than 12,000,000 feet of oil field pipe!**

In Tube-Kote's modern research laboratories, daily testing insures the high quality of TK-2 and all other Tube-Kote plastic linings.



One of the machines in Tube-Kote's exclusive compounding department.

Pioneers in plastics since 1939 . . . manufacturers-extruders of plastic pipe for the oil industry.

Factory-trained field engineers available for consultation in all principal oil areas.

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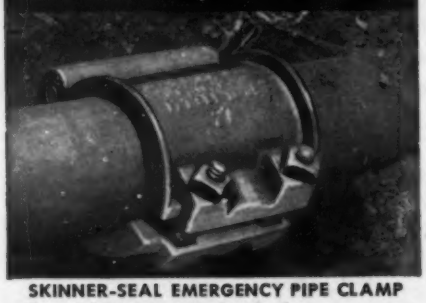
QUICKLY, PERMANENTLY
*ANY PRESSURE — ANY TEMPERATURE*

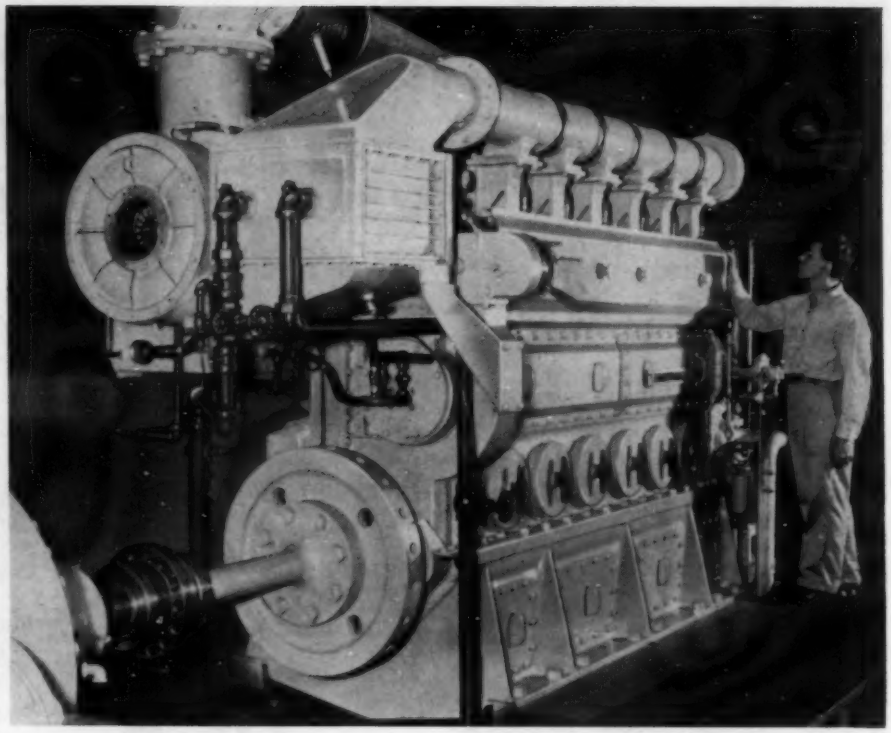


**SKINNER-SEAL EMERGENCY PIPE CLAMP for pinhole or corrosion leaks.**

**SKINNER-SEAL PIPE LINE CLAMP for long splits and bad corrosion leaks.**

*In stock—all supply stores*

M. B. SKINNER COMPANY
SOUTH BEND 21, INDIANA, U. S. A.

## New Engine Design

A new design in moderate speed, four-cycle, heavy duty diesel, dual fuel and gas engines with ratings up to 1400 horsepower has been announced by Worthington Corporation.

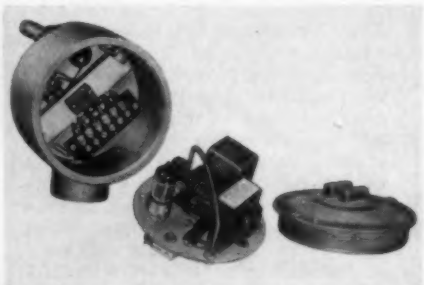
Most modern and unique feature of the company's new W 9 line is Jet-Swirl turbocharged power. This is a streamlined design for air inlet which brings the air in parallel to the inlet valve stem and gives it a swirl as it enters the cylinder. This allows ramming larger and more turbulent air charges into the cylinder giving cleaner and more complete combustion.

Designed throughout for high pressure turbocharging, the W 9 is a completely new idea in moderate speed, high performance engines capable of outputs up to 1400 horsepower at 1000 rpm. The entire engine is structurally designed for operation at higher than 200 psi, bmep.

Welded steel construction affords a low weight per horsepower ratio providing lower building, foundation and installation costs. The new engines also are adaptable for portable and semi-portable services. The W 9 engine may be arranged as a drive unit from either end, and may be equipped with any of the standard clutches, hydraulic couplings, torque converters or other power take-off equipment. The welded steel frame design still allows use of cast iron cylinder liners with water jackets cast integrally. Crankshaft of the W 9 is hung from the frame; secured by heavy cast steel main bearing caps and utilizes removable precision bearing shells.

(This item supplements Worthington Corporation data on Pages 5221-5240 of the Composite Catalog, 20th Edition.)

For more data circle **No. E9** on Readers' Service Card, last page this issue.



## Alarm

Instruments, Inc., has announced the newest addition to its line of capacitance operated level alarms. The new model B-06 Electro-O-Probe features unitized construction with an easily removed plug-in chassis assembly. The unit is contained in an explosion-proof housing suitable for use in hazardous areas.

Compactness of design eliminates need for connecting cable between probe and relay unit. Electrode insulators are available in teflon and nylon. Applicable to practically all materials, liquids, granular solids, viscous fluids or powders, the instrument operates equally well on conductive or non-conductive products. It provides instant relay operation when measured material covers probe.

For more data circle **No. E10** on Readers' Service Card, last page this issue.

## Control Panels

Control panels for automatic operation of all types of equipment can be made to specification, either for original equipment application or on-the-job requirements, by Industrial Control Panel Company. Panels are compactly built and feature new and improved circuitry specifically designed to insure reliability. Simplified construction provides low initial cost and ready serviceability. Panels are available as open-type or enclosed in dust-tight, explosion-proof, water-tight and drip-proof cabinets. All meet J.I.C. recommendations.

For more data circle **No. E11** on Readers' Service Card, last page this issue.

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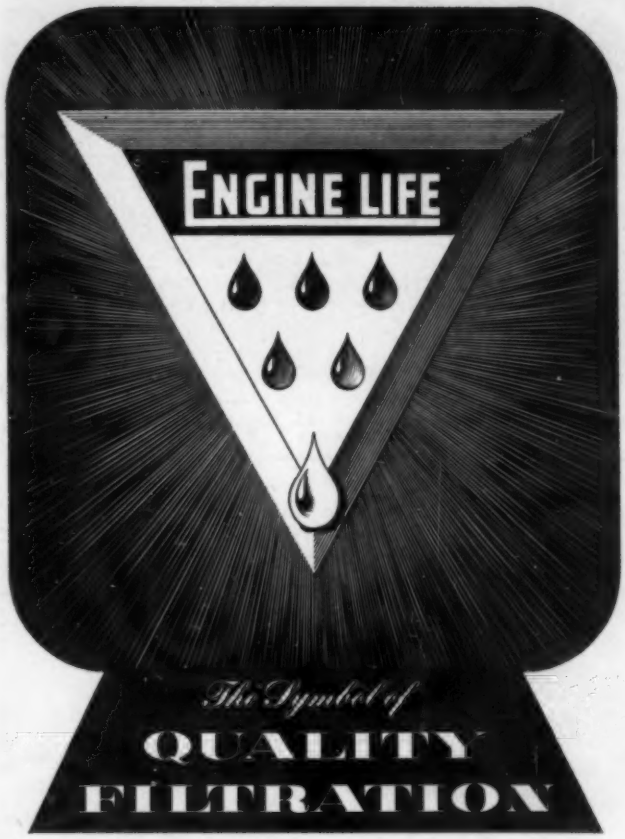
*It takes*

**QUALITY**

*to protect*

**QUALITY**

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*use* **ENGINE LIFE**

Engine Life's outstanding performance in the field of filtration is the result of constant proving and improving of the various elements, filtering media and designs in the never-ending quest for perfection. Engine Life's comprehensive coverage of replacement elements and filtering equipment, combined with specialized filter research laboratory and engineering staff, is available to competently determine the best answer to your filtering requirements. Where absolute dependability, quality and performance are essential, Engine Life's modern design filtering equipment and engineered replacement elements are your assurance of the ultimate in oil conditioning.

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**AVERAGE TANK TEMPERATURES INSTANTLY**

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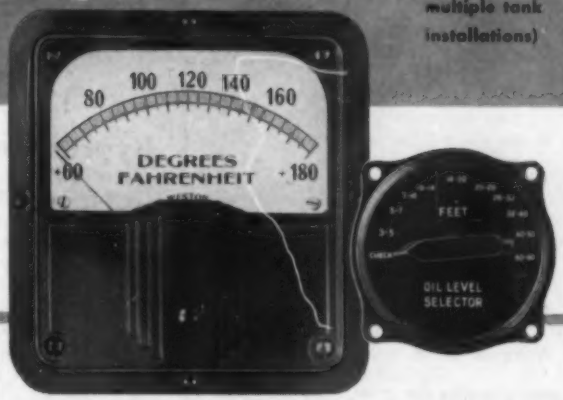


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**AVERAGING**

**RESISTANCE THERMOMETERS**

*Time saving...Money saving!* You simply turn the selector switch to the oil depth, press the button, and directly read the *average* temperature of the oil in the tank. Time: *about one second flat!* Instruments can be mounted at base of tank, or at remote control points. For multiple tank installations special tank selector panels are supplied. For the complete story, write for bulletin... Weston Electrical Instrument Corporation, 614 Frelinghuysen Ave., Newark 5, N. J.—*a Subsidiary of Daystrom, Incorporated.*

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**WESTON** *Instruments*




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**SAFETY-ENGINEERED PIPE LINE SLING**

GREENHEAD SLINGS have approximately 100,000 lbs. more strength than ordinary slings. GREENHEAD SLINGS give you lower cost, greater durability, lighter to handle, easily operated by one man.

- 10 ply belting covers ropes on pull-out side
- No stretch to tear pipe wrapping
- Cable Protector saves wire ropes
- Tough, cast, bearing-plates
- 4-9/16" wire ropes in basket hitch, 222,400 lbs. ultimate strength
- Completely eliminates the old ball and pins

Write us about your special sling requirements

**GREENHEAD SLING AND SUPPLY COMPANY**

3912 Leeland Houston, Texas

In Boiler Scale Removal and Prevention

**SAND-BANUM**

Pure Colloidal Concentrate

CASE HISTORY—Foaming and priming were exceedingly bad and frequent repairs to several engines due to water damage were necessary.

After trying upwards of 20 chemical compounds enough SAND-BANUM was supplied to permit a three months' test. The foaming and priming was stopped in 2 or 3 days and the scale began to disappear.

With the operation of SAND-BANUM, the washing periods were extended to 6 and later 8 weeks, REDUCING THE COST OF MAINTENANCE FROM $72.50 PER WEEK TO LESS THAN $30.00.

Send for details of our "Better Than a Money Back Guarantee" that you, too, may enjoy similar results.

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**COLLOID PRODUCTS CO.**

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**AMERICAN SAND-BANUM CO., INC.**

Established 1926

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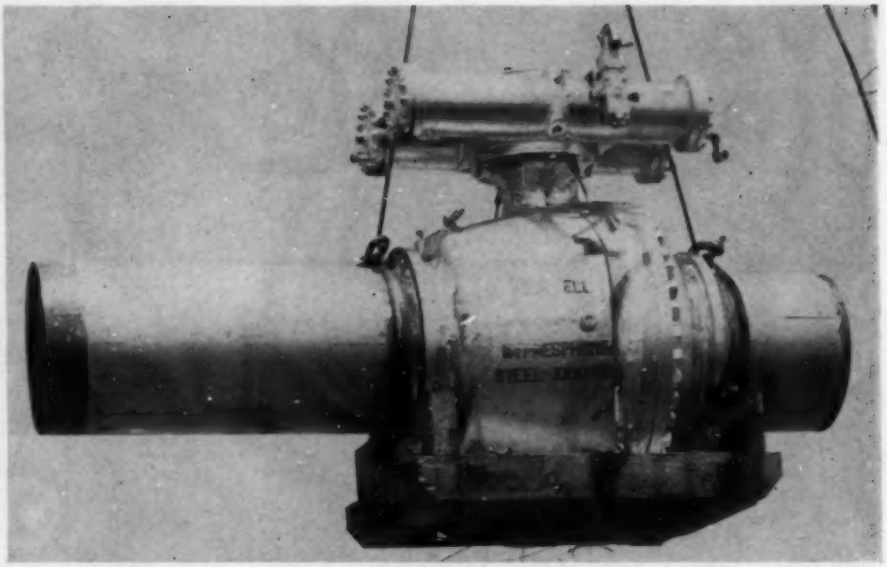
FREEPORT, NEW YORK

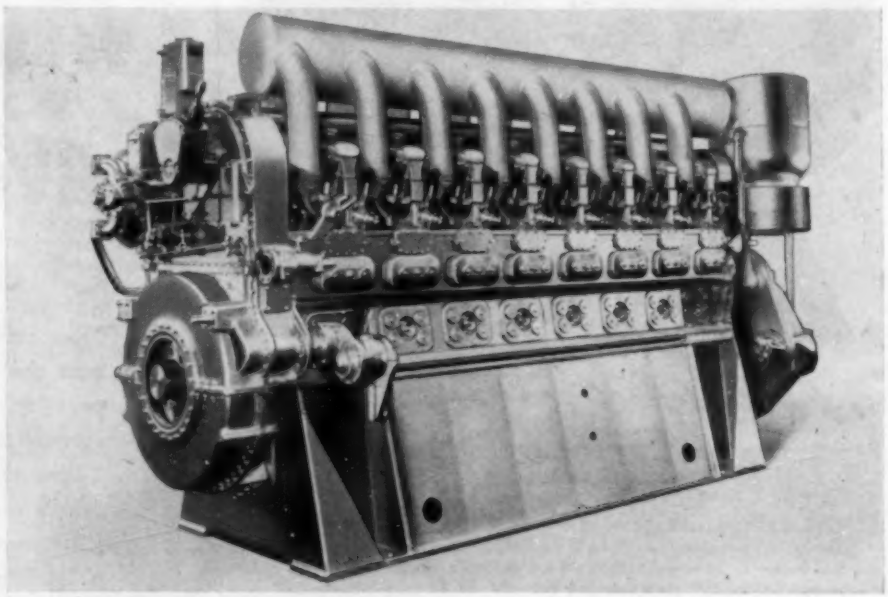



## Hypresphere Valve

Rockwell Manufacturing Company recently supplied the Brea-Olinda, Calif., pressure-limiting station of Southern Counties Gas Company with a new 30-inch Nordstrom hypresphere valve. The valve replaced a 24-inch Nordstrom valve at the station where pressure of natural gas transmitted through the company's pipe lines is reduced before delivery to the Los Angeles metropolitan area. The valve is the main-line block valve for the 30-inch line.

The valve will be tested and evaluated under actual performance in the station. Results will be passed on to Rockwell and if satisfactory, it is probable that wide future use will be made of the equipment in the industry.

For more data circle **No. E12** on Readers' Service Card, last page this issue.



## Diesel Engine

General Motors Diesel Engine division has announced the first turbocharged 2-cycle "V" type diesel engine which was designed particularly to meet increased demands for greater horsepower by the marine and industrial markets. The engine which has a bore of 8¾ inches and a stroke of 10½ inches, will develop 175 brake horsepower per cylinder and is available in 6, 8, 12 and 16-cylinder sizes.

Important advantages of the new engine are lower initial and installation costs per horsepower, fewer working parts per installed horsepower, lower operating costs because of higher efficiency and much lower maintenance expense per horsepower. As compared with a non-turbocharged engine, the new model develops 60 percent more horsepower per cubic foot of engine volume and the horsepower per pound is increased by the same percentage.

Over-all noise level of the turbocharged engine is less than that of any other engine in its class.

(This item supplements General Motors, Diesel Engine Division, data on Pages 1349-1355 of the Composite Catalog, 20th Edition.)

For more data circle **No. E13** on Readers' Service Card, last page this issue.

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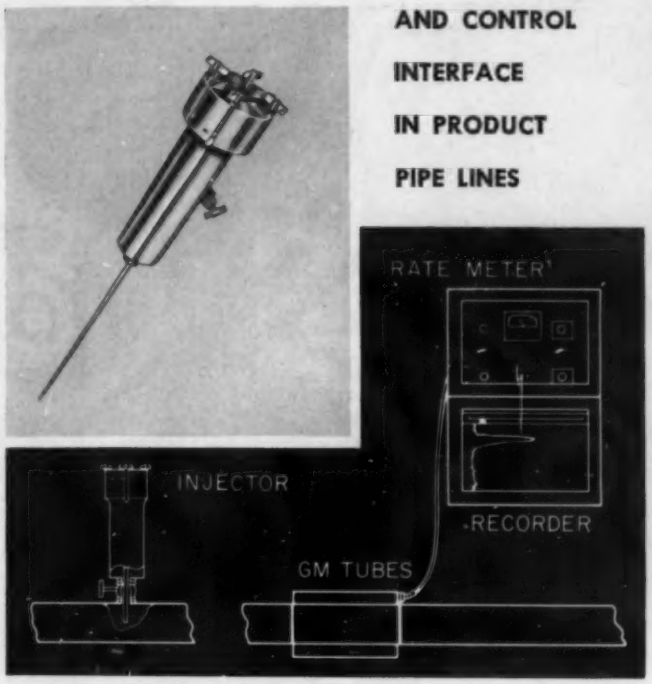
## *Problem:* ACCURATELY LOCATE AND CONTROL INTERFACE IN PRODUCT PIPE LINES




## *Solution:* RADIOACTIVE INTERFACE MARKING SYSTEM

**Description of Application:** A simple Tracerlab injection device which fits a standard ½-inch gate valve contains a sealed capsule of a short-lived radioisotope and a small $CO_2$ cartridge. When the interface reaches the valve, injection of the isotope is made in a fraction of a second by a trigger which releases the $CO_2$. The radioactive tracer travels with the interface and signals its location and the extent of product commingling both at automatic booster pump stations (where pumps can be started by the radioactivity) and at terminals and intermediate take off points. Geiger tubes attached to the outside of the line pick up a signal from the tracer and feed this signal into counting rate meter-recorder combinations at take off points and at the line terminus. This information may be telemetered ahead to warn operators or to operate pumps or valves automatically. Advantages of the method are reduced slop cuts, closer product control through more accurate measurement of commingling, and the savings in operator time through the elimination of sampling. Complete equipment, including regular shipments of sealed isotope capsules, is available from Tracerlab.

**For a complete report on the economies of interface tagging, request papers Nos. 76-53.**

130 HIGH STREET, BOSTON 10, MASS. **Tracerlab** INC. 2030 WRIGHT AVENUE, RICHMOND 3, CALIF.

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A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol.

## MAGNETROL

**AS DEPENDABLE AS MAGNETIC FORCE ITSELF**

● No matter how specialized the liquid level control application, adapting Magnetrol to meet it presents no problem. Whether it's for high pressures, high temperatures, corrosive liquids or any other condition, a few "standard" modifications and the job is done! Operation is so simple no changes in basic design are needed. That's why Magnetrol "fits" practically any application — why "specials" are so often standard with us.

Because of the utter simplicity and dependability of its magnetic principle, Magnetrol has *infinite operating life.* There are no wearing parts to get out of order.

Magnetrols are available for controlling level changes from .0025-in. to 150-ft., with single or multi-stage switching. Our experienced engineering staff is at your service.

**MAGNETROL, Inc.**

**WHY NOT MAIL THE COUPON — NOW**

MAGNETROL, Inc., 2128 S. Marshall Blvd., Chicago 23, Illinois
Please send me catalog data and full information on Magnetrol Liquid Level Controls.
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# EXCEL-SO

HP-700
CLUSTER
REPACK
SEPARATOR
STRAINER

***the only high volume pipeline strainer that removes free water from petroleum products!***

The HP-700 is rated from 750 to 1000 GPM on gasoline and fuel oil. The four repack cartridges provide a total filtering area of approximately 5,500 square inches. This Separator-Filter effectively removes solid particles down to forty microns in size. Equipped with quick opening closures and other easy service features, this compact unit is designed especially for the pipeline industry. Write for detailed information.

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**STANDARD OF THE INDUSTRY . . .**
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# ALSTON
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# PIPE CUTTER

There's none better for SPEED, SAFETY, POWER, ACCURACY and ECONOMY. It eliminates dangerous sparks . . . broken cutters; rollers hold pipe taut after cutting. It's easy on and off pipe . . . will cut 10" pipe in 12 min. Patented roller guides. Rachet makes it easy to work in close places.

A size for every requirement . . . write for details, literature and prices.

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*Skill, Integrity and Responsibility*

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# PIPE LINES

**Oil Field Stations** **Electrical Installations**

# New Equipment Literature

**For more data on New Equipment or copies of Catalogs and Literature reviewed in this issue, use the Reader Service postcards just inside the back cover and facing the Advertisers Index. Simply circle code numbers of items desired—sign and mail card.**

## Expansion Joints, Hydropads

Cook Electric Company has issued a new catalog on bellows type expansion joints and pressurized Hydropads. The catalog gives details of construction, specification and general application data for standard Magnilastic expansion joints in various piping systems. Considerable data is included on pressurized Hydropads for controlling pipe line surge.

To get a copy circle **No. E14** on Readers' Service Card, last page this issue.

## Diesel Electric Sets

The new line of small size, high capacity Caterpillar diesel electric sets are described in "Modern Electric Power," latest publication of Caterpillar Tractor Company. The booklet describes the advantages of these sets, matched to their Cat engines to provide maximum efficiency.

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## Tank Bulletin

A new illustrated brochure which gives complete information on construction, applications and advantages of collapsible storage tanks for storing bulk liquids has been announced by The Goodyear Tire & Rubber Company. The pillow-type tanks, originally developed for military use, are constructed of two layers of fabric reinforced synthetic rubber, vulcanized into a single unit. They are now in production for commercial use.

To get a copy circle **No. E16** on Readers' Service Card, last page this issue.

## Booster Compressors

Le Roi gas booster compressors are featured in a new bulletin recently issued by Le Roi Division of Westinghouse Air Brake Company. Sectional views, component parts and the complete packaged unit, which consists of a gas-gathering compressor powered through a clutch and V-belt driven by a Le Roi engine, are illustrated. A two-page sectional view of the compressor illustrates 18 specific features of the 5, 7, 9, 11 and 13-stroke machines, ranging in size from 10 to 300-horsepower.

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## Coupling Booklet

"Transite Pressure Pipe and the Ring-Tite Coupling" is an illustrated booklet just issued by Johns-Manville. It shows manufacturing methods in producing this asbestos-cement pipe for water systems and describes savings in installation time and outlines characteristic advantages once the pipe is in the ground. Step by step, it gives recommended procedures for installing the pipe and assembling the Ring-Tite coupling. A table of sizes and fittings is included.

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## Drilling Machines

The new 18-inch Royal Model LE drilling machines, announced by Cincinnati Lathe and Tool Company, are featured in a new company bulletin. Especially suitable for production, toolroom, maintenance, school and general purpose duty, the single spindle floor models and single and multiple spindle production bench models now available are illustrated and described. Lists of specifications, general dimensions and standard and extra equipment available also are included.

To get a copy circle **No. E19** on Readers' Service Card, last page this issue.

## Precision Machine Tool

A precision machine tool for refinishing diesel crankpins within the engine and without removing the crankshaft is featured in a new booklet put out by Aero-Motive Manufacturing Company. Pictures illustrate the simple 10-step sequence of operations after removing connecting rod from crank pin. The machine runs on two split adapters that bolt on to crankcheeks, the machine itself being built in halves, one half carrying the cutting bits and the other, the honing stones.

To get a copy circle **No. E20** on Readers' Service Card, last page this issue.

## Horizontal Filters

New features that speed up operation and simplify recovery or disposal of filter cake which are now being built into Industrial Filter and Pump Manufacturing Company's line of horizontal filters are featured in a bulletin recently released by the company. Illustrations and data are included for the new quick opening, hydraulically operated and sealed door, filter leaves which lift out and snap back into place without bolts and an optional vibrating attachment which shakes off the filter cake. Standard features also included are power or manual withdrawal of leaf assembly, bottom outlet, air drying facilities and optional leaf spacing.

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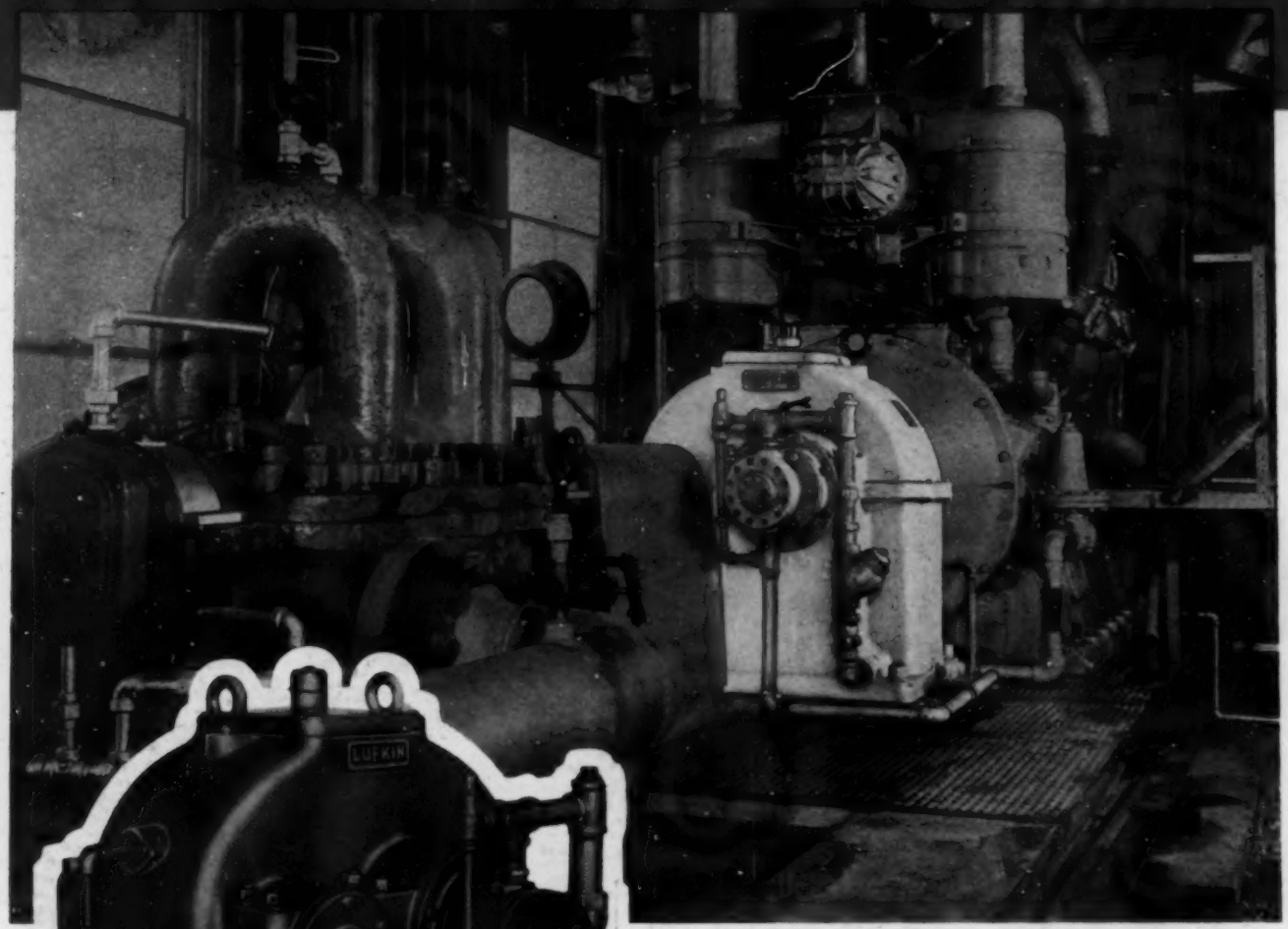

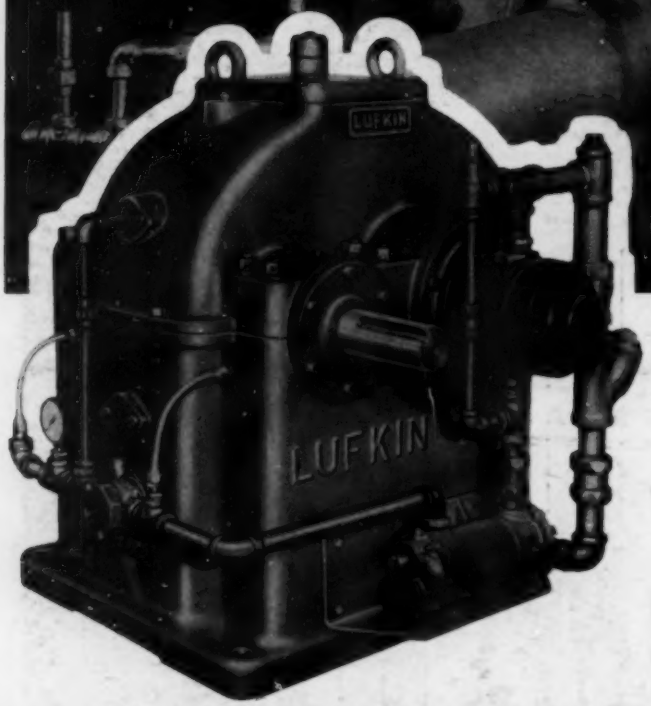


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